

ISSUE 5

WAR monthly

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will fire
three rounds
without being
destroyed'**

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is bought at the
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Back numbers

Back numbers of War Monthly are available from Department V, M/C Ltd., P.O. Box 80, Slough, SL3 8BN, England, for 40p per issue including postage.

Readers in the US and the British Commonwealth outside the UK should obtain back numbers through their regular magazine supplier.

Published by
Marshall Cavendish Ltd.,
58 Old Compton Street,
London, W1V 5PA, England.
Telephone 01-734-6710.
Telex 23880

Printed in Great Britain by
Severn Valley Press Ltd.,
Caerphilly, Glamorgan.

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US and Canada on sale date:
August 1974

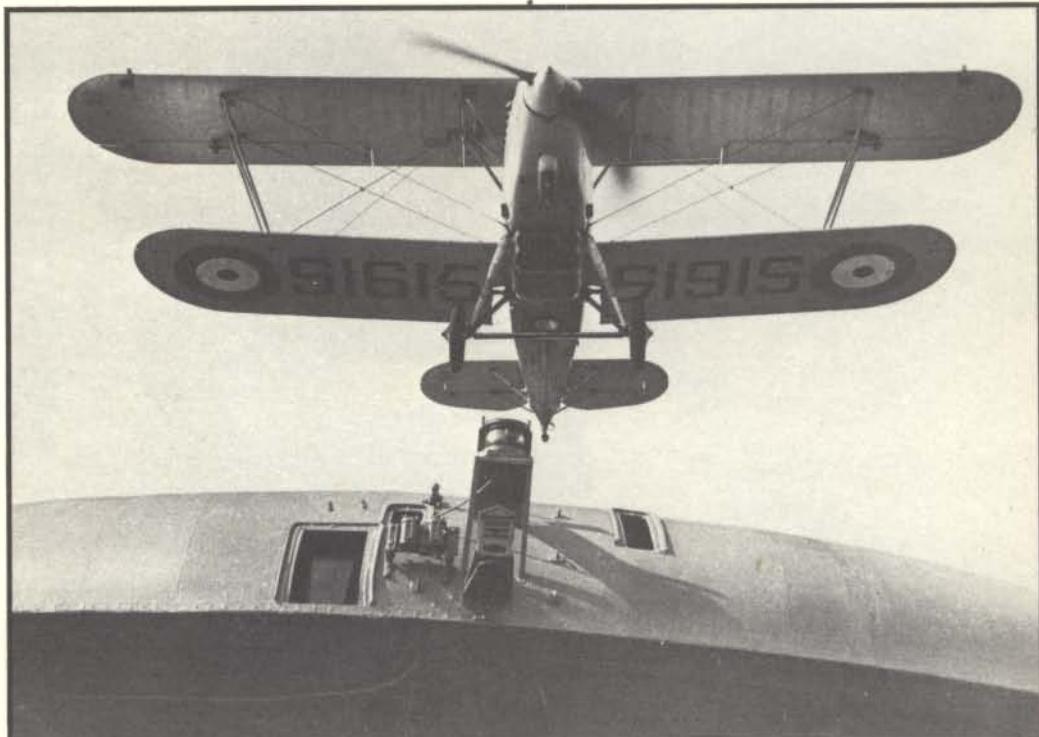
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Picture research undertaken by
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△ A Hawker Nimrod, Mk I, lifting off from the round-down of the aircraft-carrier Furious. The period between the World Wars saw great strides in carrier and naval flying development.
▷ Dien Bien Phu—French counter-attack goes in, supported by an M24 'Chaffee' light tank (far right). The paratroops watch the mortar barrage to their front.

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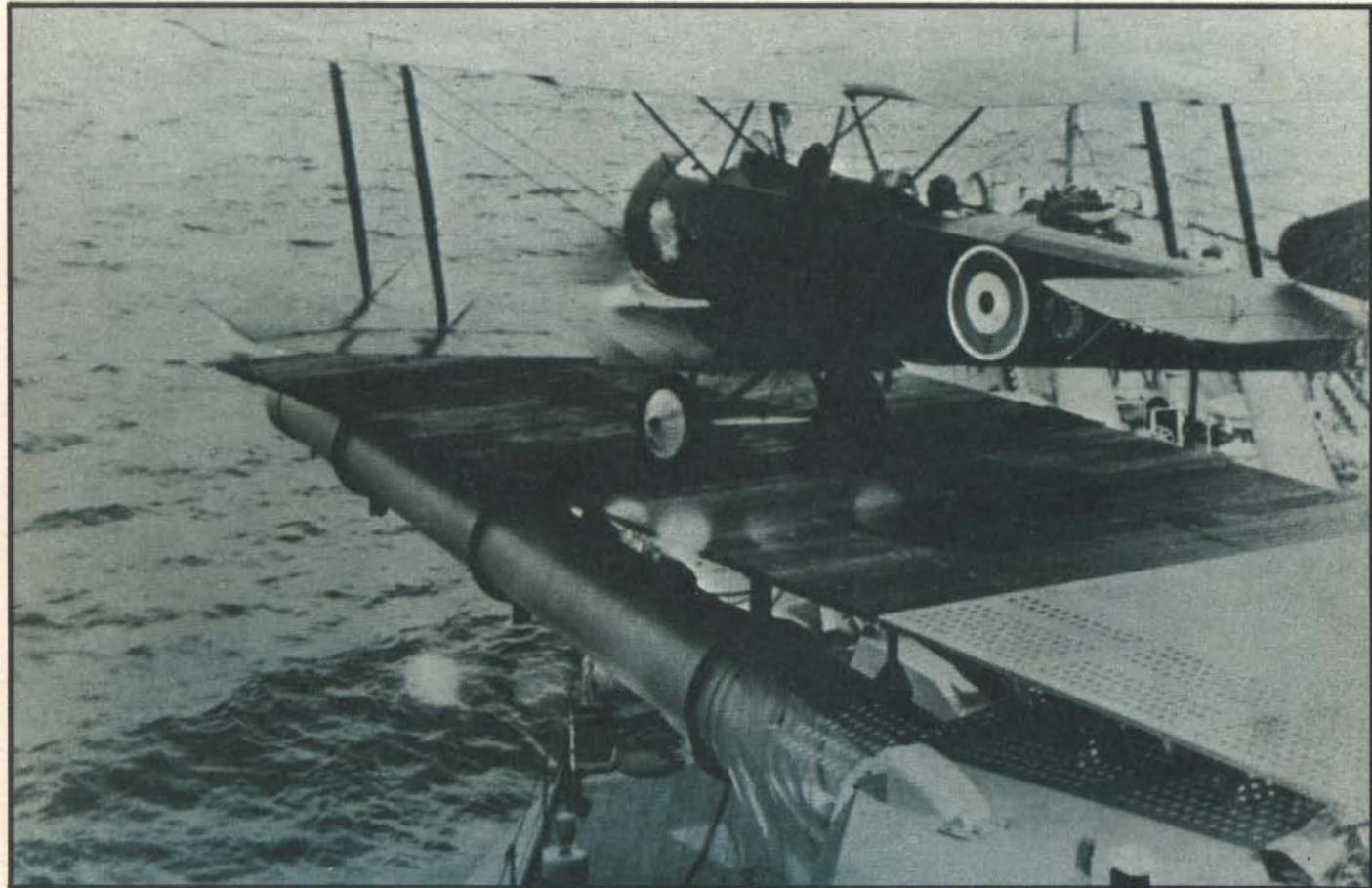
Sport & General



E. C. P. Armées

BIRTH OF THE 'FLAT TOP'

In 1912 antipathy and scepticism greeted naval pilots. But their bravery and ingenuity led to the emergence of the aircraft carrier



A Sopwith 1½-Strutter takes off from a platform mounted on a gun-turret. Flt.-Lt. Rutland first achieved such a feat by taking off from a 20ft platform mounted on the bows of the Yarmouth in June 1917. He later took off from a gun-turret platform.

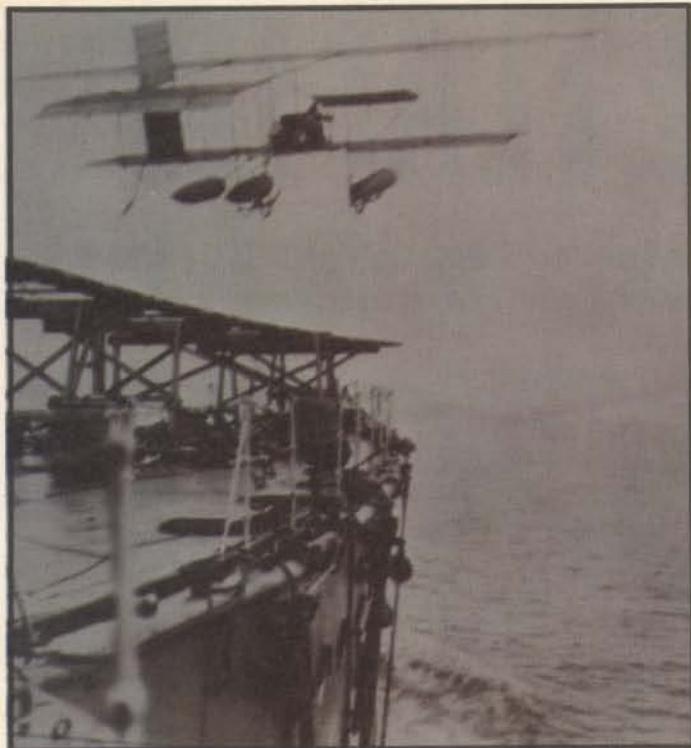
Imperial War Museum

From the time that the first practical aircraft were produced, men started to explore the possibilities of using them for war. In the five years between 1909 and the outbreak of World War I aircraft took part in army maneuvers and in the Spithead Naval Review; the Admiralty formed—and, for a time disbanded—its own Air Department; and the first British naval officers learned to fly.

It was one of these, Lieutenant Charles Rumney Samson RN, who, on 10 January 1912, had perched in a Short S27 box-kite on an improvised track, built on the fo'c'sle of the cruiser *Africa*, at anchor at Sheerness, ready to attempt the first British take-off from a ship. 'When all was ready,' wrote the reporter from the *Sheerness Guardian* 'the pilot gave word to "Let go all", and with his engine working perfectly he shot down the sloping rails clear of the ship's stern (*sic*) and was borne upon the air with the grace of some winged creature.' After that exciting moment, it was only a question of time, effort, ingenuity and the rejection of a good many

half-baked brainwaves, before the aircraft carrier emerged in all its lop-sided grace and glory, eventually to become an integral part of the world's major navies.

A number of men, Winston Churchill and Admiral Sir John Fisher among them, believed in the future of naval aircraft but they were a very small minority. Flying, in 1912, was still less than 10 years old. Aircraft were few, fragile, and desperately unreliable; and it took considerable imagination to envisage these delicate contraptions being of either use or danger to the mighty metal of the British Grand Fleet. The most that the majority of senior naval officers would grant was that aircraft *might* conceivably be of value in enabling them to see over the horizon—and for this, according to one admiral, 'two aeroplanes would suffice for the needs of the Navy in the next war—but their presence must not interfere with the work of the guns. A minor reconnaissance role was as much as they were prepared to concede them.'

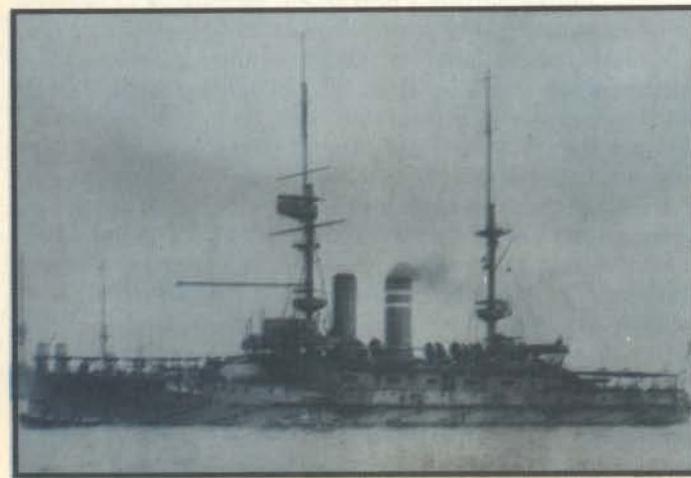


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Lt. Charles Rumney Samson, a pioneer of naval aviation, takes off from the Hibernia in a Short S27 on 2 May 1912. Hibernia was under way, when on 10 January 1912, again in an S27, Samson took off from the anchored cruiser Africa to become the first British flier to fly off a ship.

The early naval pilots, of whom Samson was one, had other ideas—they poured their energy and enthusiasm into devising bomb-racks and sights, installing wireless telegraphy (W/T), experimenting with guns and cameras strapped to the fuselage or mainplane, taking off from, and landing on, water, and launching torpedoes. But although they steadily proved that all these uses of aircraft were possible, and the Admiralty allocated the cruiser *Hermes* as the parent ship of the Naval Wing of the newly-formed Royal Flying Corps, the innovators were already up against

Successful take-offs from Africa and Hibernia were followed on 4 July 1912 when a Short S27 was flown off the temporary and somewhat rickety platform constructed on the fo'c'sle of the pre-Dreadnought battleship London (below). The platform is built over the fore gun-turret.



Imperial War Museum

a number of technical problems which were to bedevil naval flying throughout World War I.

The most persistent of these problems, the one that distorted and stunted the effectiveness of naval aircraft during those five or six years, was that of recovering the machine at the end of its flight. It was one thing to take off from a platform rigged over the bows of a ship but quite another to land back on. But it had been done. Eugene Ely, an American pilot, succeeded in putting a Curtis 'pusher' down on a platform built on the quarterdeck of the cruiser *Pennsylvania*—and downwind at that—in January 1911. But it was no more than a stunt—and even Captain W. I. Chambers USN, who had fathered the experiment, did not see the implications. He, like the British, turned his attention to seaplanes.

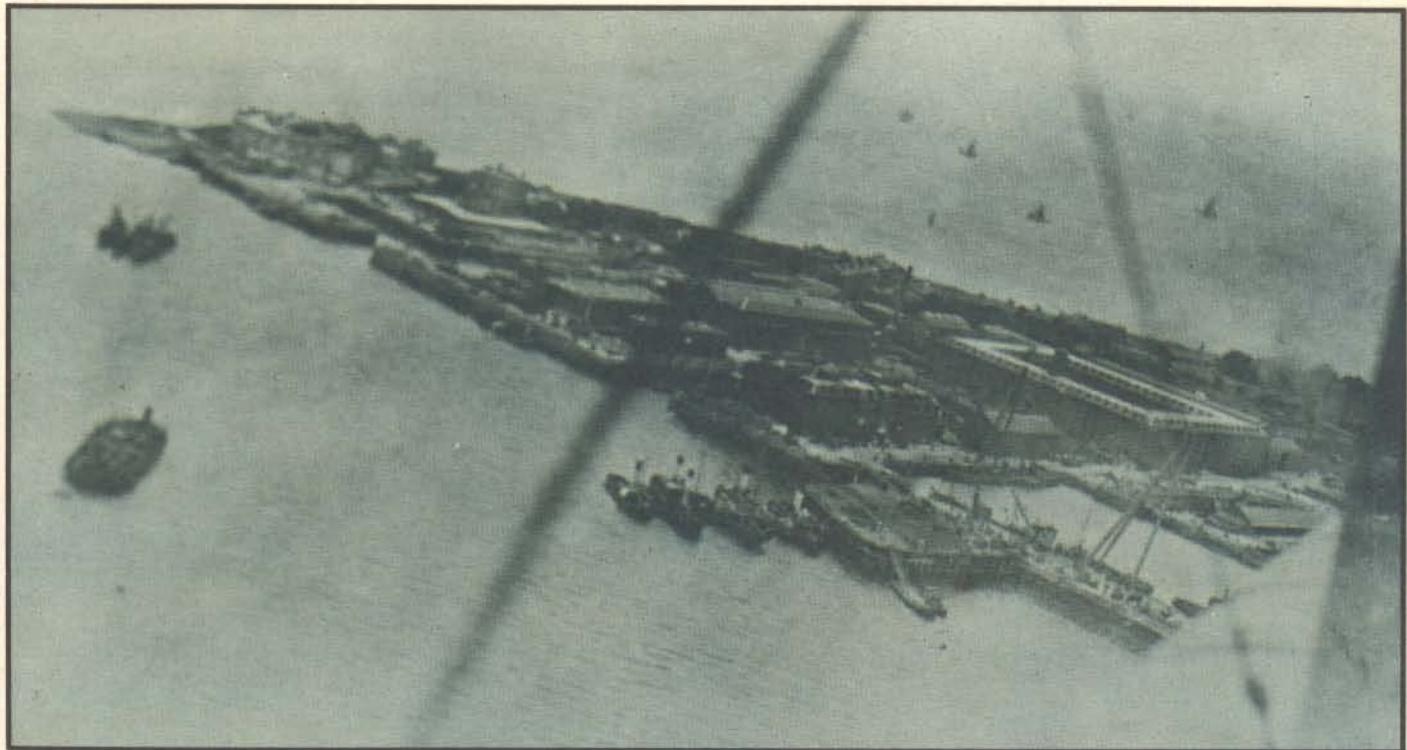
The seaplane, known at first as the 'hydro-aeroplane', until Churchill mercifully coined an alternative, could take off from, and land on, water and it appeared to be the obvious, and the only, solution. It required no platforms or other paraphernalia; all it needed was a crane to hoist it in and out of the water, and some form of hangar to house it. Apart from *Hermes*, therefore, which was sunk within two months of the outbreak of war, seven of the first eight ships employed to operate aircraft with the navy were simply seaplane carriers. Six of them were hastily converted cross-channel ferries; one, the first *Ark Royal* (not the first ship bearing the name, but the first in the context of naval flying) was a merchant ship ordered for conversion in 1913, and commissioned the following year. She was 366ft long and could carry 10 seaplanes, but her top speed was only just over 10 knots. She was the first ship ever to be completed as a seaplane carrier—and she represented the first of several dead ends so far as naval flying was concerned.

Imagination and frustration

Much of the fascination of these pioneering years is to be found in the vaulting imaginations of the airmen, and the frustrating intransigence of the problems that stood between them and their visions. The attempted raid on the Cuxhaven Zeppelin sheds by nine seaplanes on Christmas Day 1914 illustrates the discrepancy between means and ends. Inspired by Vice-Admiral Murray Sueter, Director of the Air Department in the Admiralty, it was the first attempt in history to use naval air power offensively.

The task force that rendezvoused 20 miles north of Heligoland that first Christmas morning of the war included three of the converted packet-boats, *Engadine*, *Riviera* and *Empress*, carrying three Short seaplanes each. Luckily it was calm and seven of the nine managed to get airborne; but visibility was poor over the German coast and none succeeded in finding the Zeppelin sheds. The only damage they did cause was when two German warships in the Schelling Roads up-anchored in a panic and collided. Later attempts to attack the Zeppelins' bases, or the W/T station at Norddeich, were foiled by rough seas, underlining one of the several limitations of the seaplane. To the inability to operate at all in a seaway could be added poor load-carrying, a slow rate of climb, and a low ceiling.

These disadvantages were slightly less critical in the Mediterranean than they were in the North Sea; and several seaplane carriers, including *Ark Royal* and *Ben-my-Chree* did useful work—especially air photography—during the Dardanelles campaign in 1915, and afterwards. *Ben-my-Chree*, an ex-Isle of Man packet, was equipped with a flying-off deck, but it was never used.



A view of the German coast taken from one of the seven Short seaplanes engaged in the abortive raid on the Cuxhaven Zeppelin sheds on Christmas Day 1914. The seaplanes failed to find their target in very poor visibility.

This reluctance to use the flying-off deck remained for as long as seaplanes were regarded as the only type of aircraft suitable for operations with the fleet at sea. The *Campania*, an ex-Cunard liner which joined the fleet in 1915 had a deck 120ft long—but it was not used either.

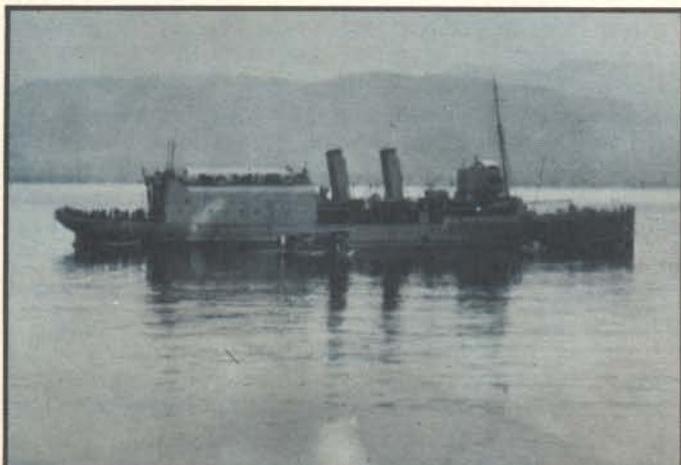
Then, both literally and figuratively, a new factor, which was to secure the demise of the seaplane and force a reappraisal of the role of naval flying, appeared on the horizon. This was the Zeppelin. Roving out from their North Sea bases, they hovered on the wings of the Grand Fleet—rather as Russian Very Long Range (VLR) aircraft do round NATO exercises today—reporting every move they made, and serenely invulnerable.

In July 1915, Admiral Sir John Jellicoe, then Commander-in-Chief, wrote to the Admiralty that 'no seaplane has yet succeeded in flying off *Campania*', and that, in any case, they were 'incapable of engaging the Zeppelins owing to their insufficient lifting power'. And he went on, in a sentence that is absolutely crucial to the development of

naval flying and, therefore, of the carrier: 'I regret that I am unable to propose any means of meeting this menace, unless it be by the use of aeroplanes, rising from the deck of *Campania*, capable of climbing above the Zeppelins and able to land on the water and be supported sufficiently long by air bags to allow the rescue of the pilots'.

There was still, even in Jellicoe's mind, no thought of trying to land the aircraft on again, but having been forced to think in terms of *aeroplanes* by the inadequacies of the seaplane, it was only a matter of time before the solution became starkly obvious.

The original *Hermes* had succeeded in launching a Caudron amphibian—the only one in existence—from her flying-off platform before World War I; and *Campania*—perhaps stung by Jellicoe's jibe—achieved the same feat in August 1915. But the machine took 113ft to get airborne. After that the ship went into dock to have her deck lengthened. In the meantime, yet another ex-ferry, *Viking*, joined the fleet as the *Vindex*. Among her complement of



Imperial War Museum

◀ The *Empress*, one of the three ships involved in the Cuxhaven raid. A Short taxies alongside.

▷ Rear Admiral Sir Murray Sueter, Director of the Admiralty Air Department. A believer in the need for Britain to dominate the air as well as the sea as far back as 1912, Sueter's subsequent development of naval air operations earned him the honorary title 'father of naval aviation'.



A Short 166 seaplane flying past Ark Royal, a merchant ship hastily converted from a cross-channel ferry in 1913. She was 366ft long and could carry ten planes.



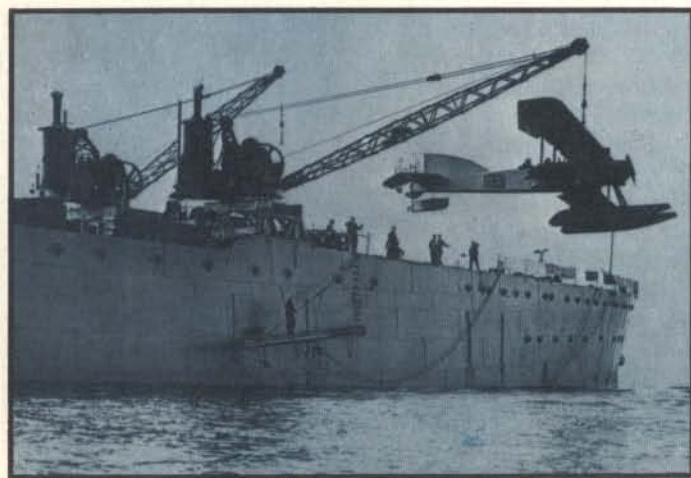
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aircraft were two single-seater fighters, partially dismantled; and in November 1915 a Bristol Scout took off successfully from her deck.

But that these were still makeshift arrangements for operating aircraft from ships is made quite plain by the following description from *Campania*, after her refit:

...between the funnels there was a door that led into the hangar which was some feet below. Seaplanes were stowed with wings folded, and were hoist out by derrick, either on to the flight-deck or over the side . . . At sea, aircraft took off from the launching deck, being lowered on to a wheeled axle . . . After take off, the pilot released the wheels and axle, which fell into the sea and could be recovered by the attendant destroyers.'

One of naval aviation's several dead ends was the hoisting of seaplanes in and out of the water by seaplane carriers. It slowed the development towards take-off from, and landings on, carrier decks. Here Ark Royal hoists a Short type 166 seaplane on board with one of its steam cranes.



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Campania was not present at the Battle of Jutland on 31 May 1916. Naval air power was represented by the seaplane carrier *Engadine*. Her aircraft flew one sortie, which would have been highly useful if the sighting reports had ever reached Admiral Beatty. But they did not. Of more interest than the flight is the pilot, Flight Lieutenant F. J. Rutland, RN, an ex-rating who brought something of Samson's persistence and courage to bear on the problems of operating aircraft from ships.

It was Rutland who, in June 1917, following another of the many false trails that criss-cross the history of naval flying, took a Sopwith Pup off from a platform only 20ft long mounted on the bows of the cruiser *Yarmouth*. Soon afterwards, he repeated the feat from a similar platform mounted on a gun-turret, with the turret swung outboard and without the ship having to steam into wind. This feat, and that of Flight Sub-Lieutenant B. A. Smart who, in August flew a similar aircraft from the same ship and shot down a Zeppelin, L23, resolved any objections the fleet might have had. Eventually two battle cruisers and more than 20 cruisers were given gun-turret platforms and Sopwith Pups, in a diluted response to Jellicoe's *cri de coeur* of two years before.

But the pilot still had to ditch at the end of the trip, a disadvantage which applied equally to another bizarre idea, the towed lighter. These waterborne trailers had originally been conceived by the flying-boat designer J. C. Porte, to ferry his boats across the North Sea and so increase their range; but they were seized upon by the indefatigable Samson as a possible means of launching fighters. And he made the first attempt himself, in a Sopwith Camel, being towed at 32 knots behind a destroyer—and cartwheeled into the sea. After some modifications to the design of the platform, he was successful; and towed lighters notched up their single victory also when, in August 1918, Flight Sub-Lieutenant S. D. Culley shot down Zeppelin L53.

But they, like turret-platforms, were not the answer to the

problems of naval flying; and the realization that this was so was at last beginning to dawn in the highest naval circles. In January 1917, Admiral Sir David Beatty, who had replaced Jellicoe as CinC, set up the Grand Fleet Aeronautical Committee to consider the whole question. From their deliberations came, in time, *Argus*, the world's first true aircraft carrier, and, before her, *Furious*, which, in her various guises, exactly represented the halfway mark between the old and the new, between the big gun and the aircraft, between the makeshift and the real thing.

Furious, one of 'Jacky' Fisher's 31-knot, lightly-armored battle-cruisers with those prodigious 18in guns, was given a sort of bastard conversion: her for'ard turret was removed—much against Beatty's wishes—and replaced with a flying-off deck, with a hangar below. Though her deck was longer, she was very little different in conception from *Campania*, of whose aircraft handling arrangements, according to Wing Commander Richard Bell Davies, hers were 'a poor copy'.

The long flying-off deck, however, and the 31 knots, put ideas into people's heads; and on 2 August 1917 Squadron Commander E. H. Dunning took off in a Sopwith Pup with the advertized intention of landing on again. The windspeed over the deck was 47 knots; Dunning 'made his approach along the port side, side-slipping in and centring up over the deck in the right position', wrote Major W. G. Moore, who was one of the handling party. 'We dashed out and grabbed our appointed toggles. We had some difficulty hauling the aircraft down squarely on to the deck and holding it in the wind, but we did so and the aircraft was secured without damage and Dunning stepped out.' It was the first time an aircraft had landed on a ship since Ely's exhibition eight years before.

His engine cut . . .

Five days later, after a second landing in which he damaged an elevator, Dunning took off for a third attempt, but abandoned his approach and opened up to go round again. His engine cut, and he went into the drink. He was only knocked out; but, incredibly, there was no safety-boat—even Ely had had that comfort, and swimmers as well—and by the time he was picked up he had drowned.

It was a tragic fate; but Dunning's death, in fact, opened up, at last, the true course for the future. This was that deck landing could no longer be regarded as a matter of negotiating a battle cruiser's superstructure and skidding to halt into the waiting arms of the wardroom—Dunning's death forced the realization that a clear flight deck was essential.

But there was still one more fallacy to be cleared out of the way. *Furious* was put into dock to have an after-deck—a landing or 'alighting' deck—installed in place of the second great gun aft, leaving the bridge superstructure virtually intact. There was a suggestion that her sisters, *Courageous* and *Glorious*, should be similarly dealt with. But, fortunately, the Admiralty decided to stay their hands until after landing trials on *Furious*.

It was as well they did, for the trials were disastrous. A combination of the funnel gases and the turbulence created by 30 knots of wind swirling round the superstructure, made landing virtually impossible. Major W. G. Moore records that the 'trouble was that directly we got over the stern of the ship, our airspeed . . . diminished because the air was going with us, and we just dropped on the deck like shot partridges.' By the time such experienced pilots as Rutland and Harry Busteed had crashed or gone over the side, it was

realized that the arrangement was impracticable—and deck-landing was once more abandoned.

But now the true and only solution was grasped. While *Furious* was earmarked for further conversion as soon as she could be spared from service, the ex-liner *Argus*, which at one time had been designed to have two decks divided by a kind of gantry (like an Isle of Wight car-ferry) was stripped to the clear, bare deck, and her funnel-gases ducted aft to emerge beneath the round-down. Nicknamed 'the flat-iron'—which she exactly resembled—she was commissioned in September 1918, two months before the end of World War I. Her complement of aircraft, it is interesting to note, included a squadron of Sopwith Cuckoos, which had been designed specifically to carry a 1,000lb aerial torpedo.

Thus *Argus* was the world's first true aircraft carrier, with a deck from which aircraft could take off, and on which they could land, with equal facility. The refinements—arrester gear, barriers, catapults, the deck landing control officer, and, finally, the angled deck and the mirror sight—all these would gradually be developed during the next 25 or 30 years to enable the aircraft carrier to wrest from the battleship its role as the fleet's main strike weapon.

The history of British naval flying is laced with ironies from the start; but there is none more astringent than the historical coincidence which arranged that at the precise moment at which Dunning was making this possible, a South African General whose knowledge of flying was inconsiderable, was preparing a report which was to recommend the abolition of the Royal Naval Air Service and its replacement by 'Air Force Contingents' from a unified air force, to be known as the Royal Air Force.

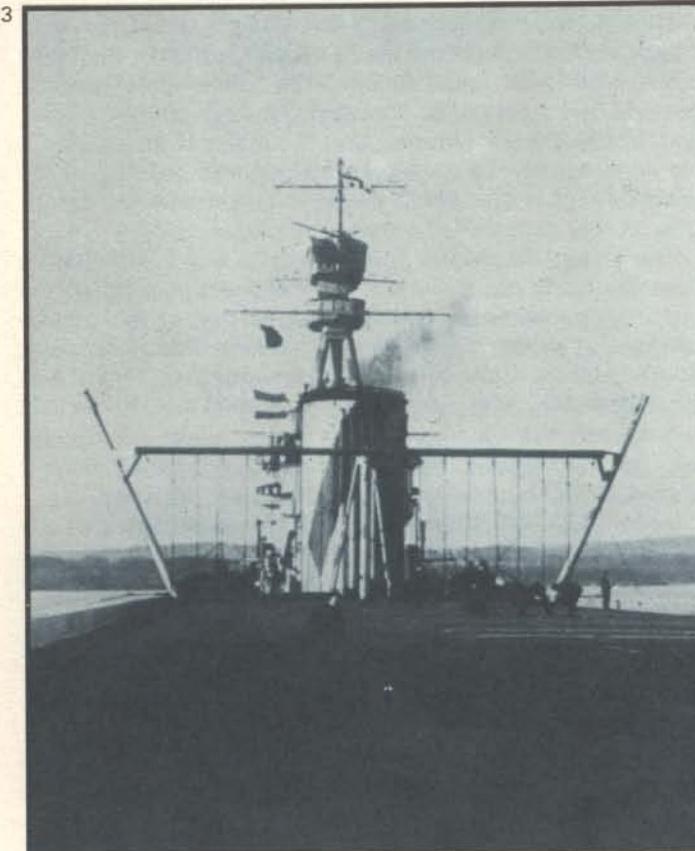
General Jan Christian Smuts' report was accepted by the wartime Premier, Lloyd George; and on 1 April 1918 the Royal Air Force came into being, in place of the Royal Flying Corps and the Royal Naval Air Service. The direct result of this hasty and ill-considered move was that Britain, which emerged from World War I as the foremost, and indeed the only, practitioner of carrier flying, steadily gave place to the US and Japan.

America (for all that she had pioneered both take-off and landing aboard ship) was catapulting flying-boats from

Another dead end. A towed lighter transports a Sopwith Camel. Waterborne trailers that acted as one-aircraft carriers, towed lighters were seized upon by Lt. Samson as a possible means of launching fighters. Samson made the first attempt—his plane cartwheeled into the sea.



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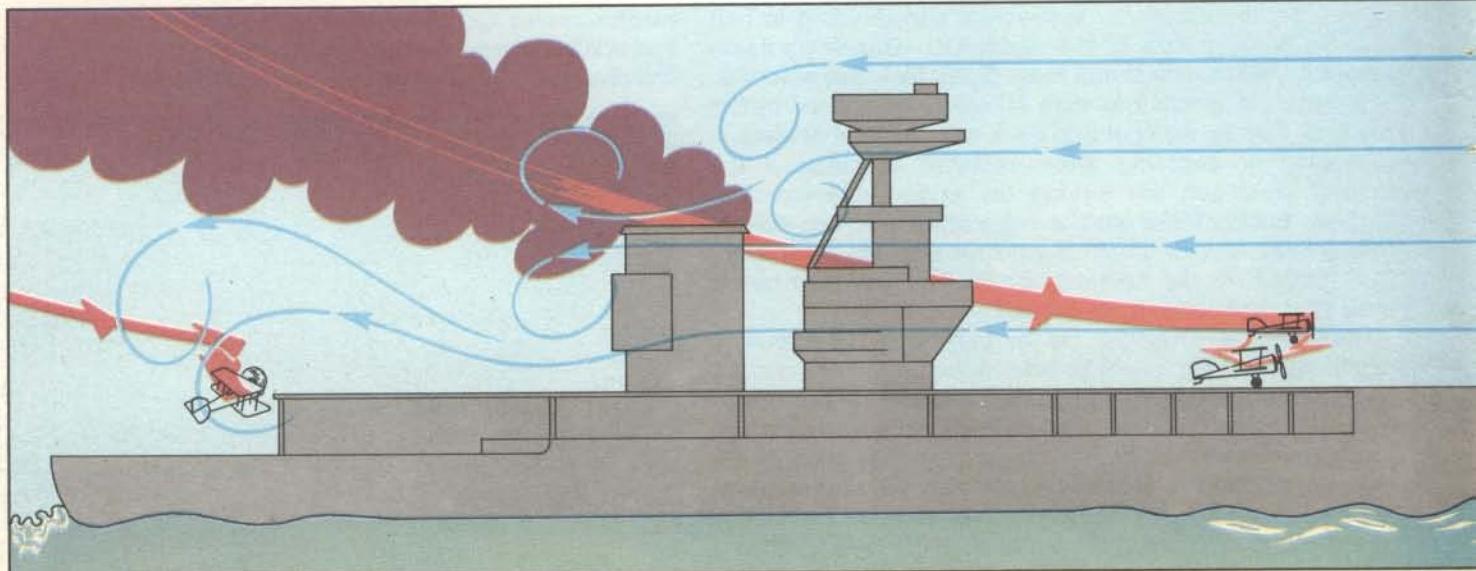
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crusiers by 1915, and had 2,000 naval aircraft when the war ended), did not have so much as a seaplane tender until 1921; and her first carrier, the USS *Langley*—known as ‘the covered wagon’—was not commissioned until the following year. The French, similarly, whose first naval aircraft were in service in 1910, and who had a converted torpedo-boat carrying two seaplanes before the war, made no progress towards a carrier throughout the war—and precious little afterwards.

The French Admiralty did consider ordering one in 1916, but nothing came of it. This was odd because it was a French inventor, Clement Ader, who, in a tract entitled ‘L’Aviation Militaire’ published in 1909, described in exact and prophetic detail the requirements for an aircraft carrier. It was to have ‘the aspect of a landing field’, but ‘without spoiling the nautical lines of the hull’, to be clear of all obstacles, and to have a hangar below served by ‘a freight elevator’. This would be ‘sufficiently long and wide to receive a plane with wings folded’.

It would seem that it was only the inextinguishable enthusiasm of a handful of British naval airmen, and the response demanded by the Zeppelins monitoring the movements of the Grand Fleet, that forced the pace at home.

The only other naval power of consequence in the first decade of the century was Japan. She was early on the scene, sending naval officers to France and America to learn to fly in 1912. The following year she converted a 7,600-ton transport, *Wakamiya Maru*, into a seaplane tender. Thereafter her progress, as so often, mimicked that of the West;





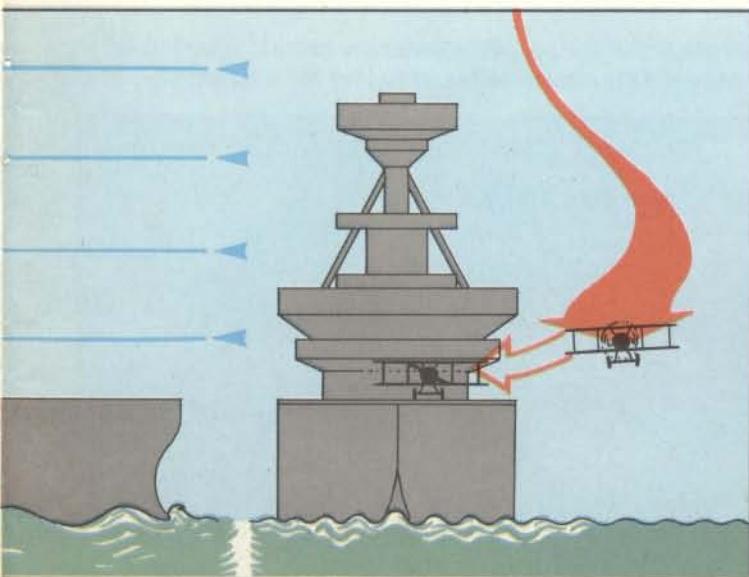
Furious change ! The 31-knot lightly armored cruiser, equipped with huge 18in guns, underwent several conversions to turn it into an aircraft carrier. 1 The Furious, after its first conversion in 1917. Her for'ard gun turret was removed and replaced with a flying-off deck with a hangar below. Later, her 18in gun aft was removed. Squadron Commander E. H. Dunning made the first British deck landing on the Furious's flying-off deck on 2 August 1917.

2 The second conversion in 1918 gave Furious flying-off decks fore and aft, and lifts, longitudinal arrester wires and a barrier. The funnel and superstructure amidships remained.

3 A pilot's view of the flight deck, barrier and superstructure of the 1918 version. **4** Furious in 1939, after her fourth conversion. She has been flush-decked.

5 Sopwith 2F.1 Camels on the Furious's flying-off deck.

▽ *'Into the waiting arms of the wardroom'. Sqn. Comm. E. H. Dunning, flying a Sopwith Pup, makes the first British deck landing, on the Furious on 2 August 1917.*



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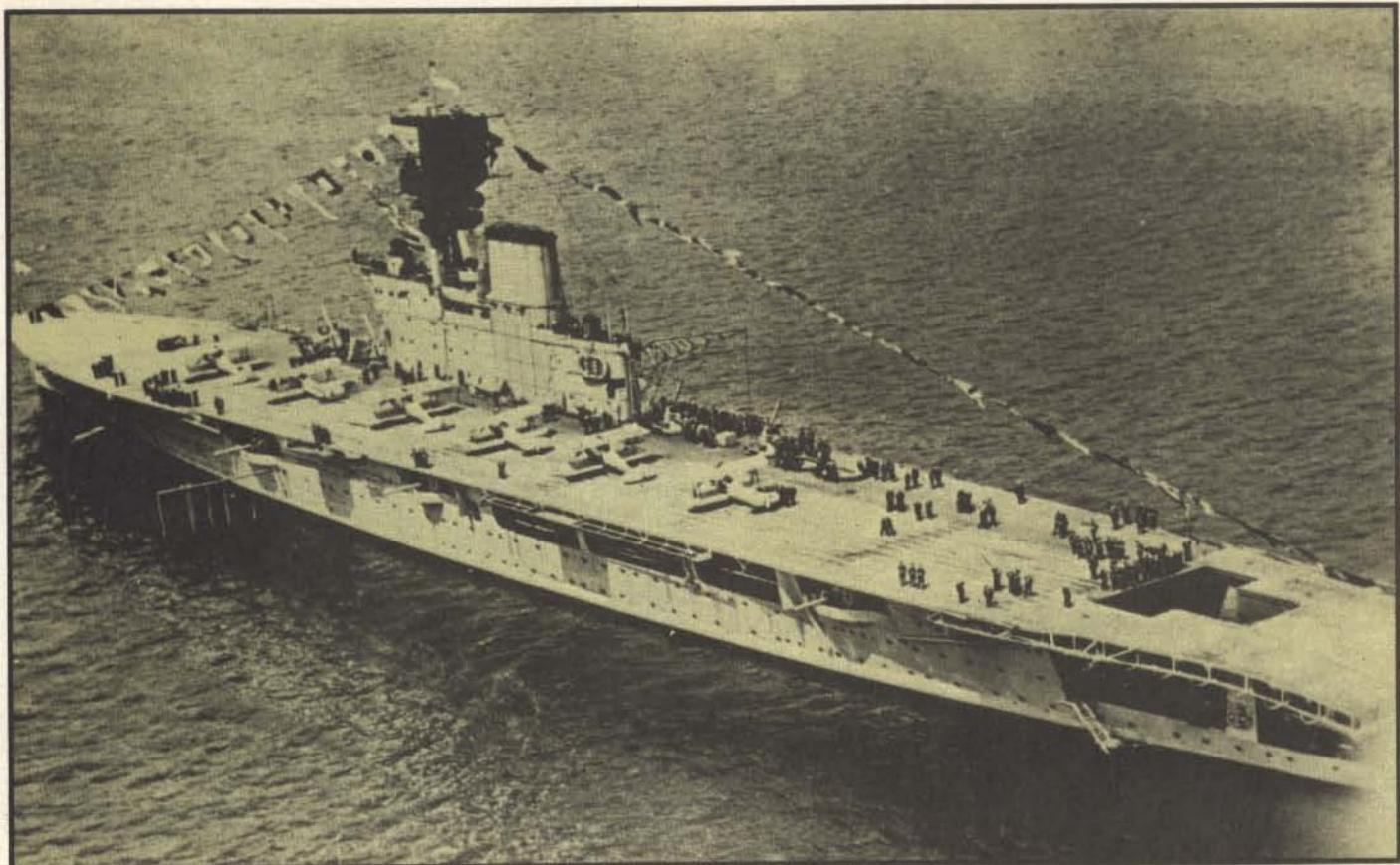
and in 1918 plans were drawn for her first two carriers. *Hosho*, 7,500 tons and 542ft long, was completed in 1922, to be followed during the next few years by *Kaga*, and *Akagi*, converted from a 43,000-ton battle-cruiser. And still the sheer professionalism of their attack on Pearl Harbor astonished the world.

Six years elapsed between Samson's first take-off from the *Africa* and the commissioning of HMS *Argus*. During those years, and in spite of the continuing scepticism of the majority of senior naval officers, the aircraft had become accepted as an essential adjunct to the fleet; the main problems connected with operating aircraft from ships had been mastered; and the blueprint for a completely novel kind of warfare had been drawn.

Before the war, Admiral Fisher had hailed 'the epoch—prodigious in its advent—when positively the Air commands and dominates both Land and Sea'; and, after the Cuxhaven raid on Christmas Day 1914, the Squadron Commander, Cecil L'Estrange Malone, had reported: 'One can well imagine what might have been done had our seaplanes, or those which were sent out to attack us, carried torpedoes

▽ *The fallacy of building an aft landing deck without modifying the bridge superstructure was proved in trials on Furious in 1917. Air turbulence around the superstructure and hot funnel gases made landing almost impossible. A temporary solution was to approach the ship in 'smooth' air and 'sideslip' on board. This too was difficult and in time the need for a completely clear flight deck was realized.*

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Argus, the first complete flush-decked aircraft carrier. Beginning life as an Italian passenger liner, but commissioned by the RN before the Armistice in 1918, she was equipped with 20 Sopwith Cuckoos. Each could carry a 1,000lb torpedo.

or light guns. Several of the ships in Schelling Roads would have been torpedoed, and some of our force might have been sunk as well.'

The foundations for that vision, of both the new power and the new vulnerability of the Royal Navy, were well and truly laid during the six-year search for the proper kind of ship from which to operate aircraft; and the truth of the Squadron Commander's vision was clinched at Taranto in 1940 when waves of Swordfish climbed from the deck of the *Illustrious* to attack Italian battleships and cruisers moored in the harbor.

As Admiral Cunningham wrote, 'Taranto and the night of

11-12 November 1940 should be remembered for ever as having shown once and for all that, in the Fleet Air Arm, the Navy has its most devastating weapon. In a total flying time of about six and a half hours—carrier to carrier—20 aircraft had inflicted more damage upon the Italian fleet than was inflicted upon the German High Seas Fleet in the daylight action at the Battle of Jutland'. Pearl Harbor, the Gulf of Siam and numerous actions in the Mediterranean and in the Pacific in World War II followed—the aircraft carrier, 20 years after the early experiments, had arrived.

Hugh Popham

Commander Richard Bell Davies lands a Sopwith 1½-Strutter on Argus in 1918. The ramp slowed the aircraft, which then went into 'the trap' behind the ramp. Here the hooks on the axle engaged the arrester wires, stopping the aircraft.



Imperial War Museum

TEL-EL-KEBIR

Brilliantly conceived, mathematically planned: one of the Victorian 'little wars'. And Britain won it to command Egypt and the Suez Canal



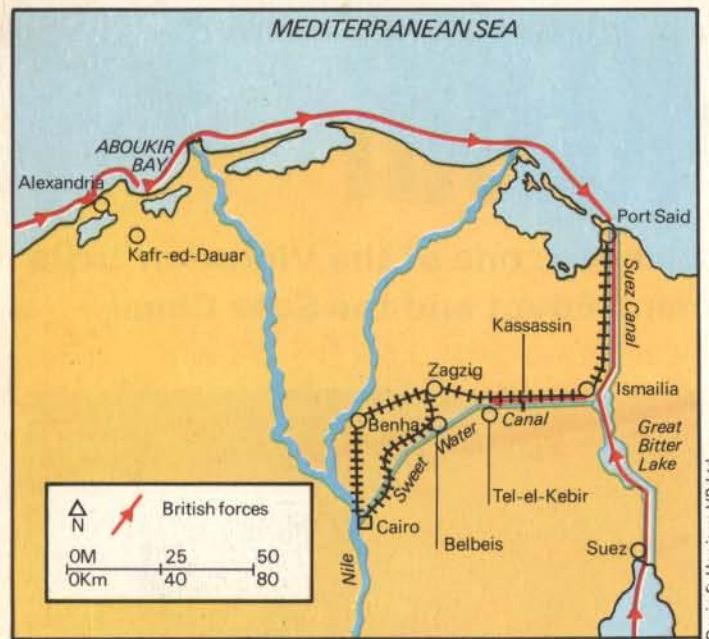
Bring up the guns! A British 9-pounder gun-team scrambles over the ditch and parapet of the Egyptian great trench in 1882. Two batteries were pushed through in support of the Highland Brigade and devastatingly enfiladed the enemy lines.

'The war in Egypt is over. Send no more men from England'. So telegraphed the victorious Sir Garnet Wolseley from Cairo in 1882. In one month he had secured the Suez Canal and occupied the whole Nile Delta. It was the shortest major campaign the British Army had ever undertaken and the climactic action—Tel-el-Kebir—lasted only 50 minutes. But 13 infantry and six cavalry regiments bear that battle honor on their colors.

The British came to a strife-torn Egypt for economic reasons. They wished to protect their immense financial investment sunk in the country since 1875 and to have direct control of the Suez Canal opened in 1869. A 'prototype' of Nasser, Colonel Ahmed Arabi Pasha, had increasingly threatened these interests and given a lead to nationalist feelings. This 42-year-old *fellahin* (peasant) had risen from the ranks to become War Minister by 1881. Finally, in May 1882, a bloodless military coup gave Arabi a *de facto* dictatorship, leaving Egypt's hereditary leader—the Khedive Tewfik—a virtual prisoner.

Anti-European riots in Alexandria roused the great powers to action; the British Mediterranean fleet silenced the Egyptian shore batteries and landed men to occupy the city. On 20 July the British Prime Minister, William Gladstone, overcame his moral qualms about imperialism and decided to send a full-scale military expedition to restore order in Egypt. A change of government in France and renewed fears of Germany left England to act alone, unfettered by any suspicious ally.

The War Office had been laying contingency plans for the invasion of Egypt since the beginning of the year and proceeded to implement them with rare speed and efficiency. Within a month, preparations were complete, including the provision of sunglasses for the troops to wear in the desert! Other novel arrangements included the equipping of the Royal Engineers with five railway engines, 105 goods wagons, and 10 miles of track so that the army would not be hampered by a sabotaged Egyptian rail system. Since the irrigation canals of the Delta would impede ordinary

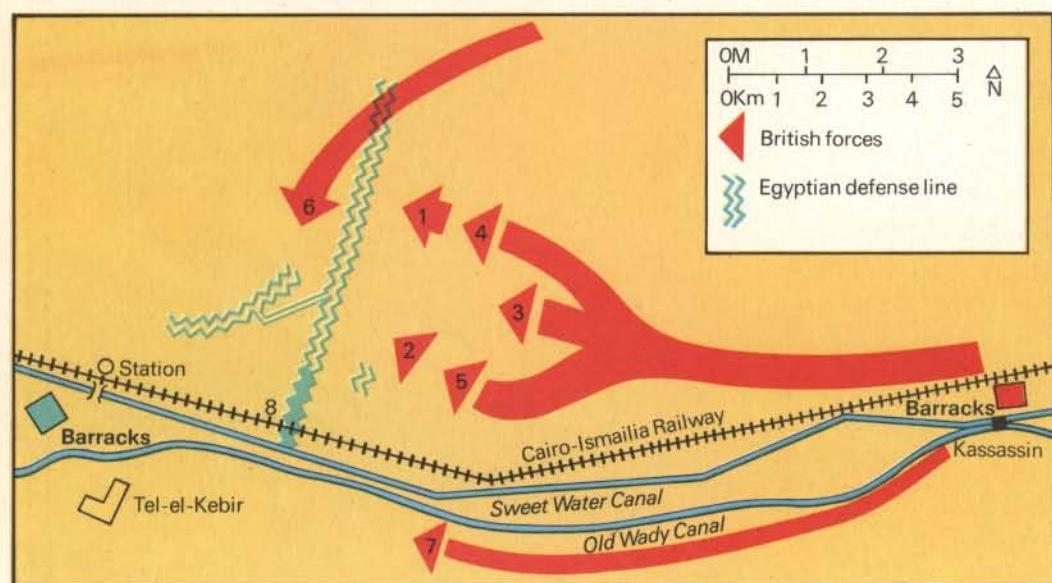


Immediately on landing, Wolseley set in motion the strategy he had formulated in London back on 3 July. This was to fix Arabi's attention with a threatened British advance up the Nile from Alexandria while secretly pouncing on the Suez Canal. The deception plan was devised especially for the benefit of the historically minded; a simulated landing was to be made at Aboukir Bay (20 miles east of Alexandria) where the British had invaded Egypt before in 1801. Meanwhile a sortie by the garrison of Alexandria towards the 12,000 Egyptians in the lines of Kafr-ed-Dauar would persuade them that the British seaborne force was going to outflank them.

All the participants thought this was the real thing, for

◁ *The British invasion of Lower Egypt in 1882. Occupation of Alexandria (12 July) and Suez (2 August) provided entry ports for the expedition from England and India. A sham landing at Aboukir to threaten Kafr-ed-Dauar drew Egyptian eyes off the Canal which was seized on 20 August for an advance to Cairo, via the railway from Ismailia.*

▷ *An hour before sunrise on 13 September, two waves of the Highlanders storm across the 6ft ditch of Arabi's trench.*



◁ *Wolseley's daring night march from Kassassin lock to surprise an Egyptian army twice his strength in two long trench lines.*

- 1 Graham's 2nd Brigade in half-battalion columns.
- 2 Alison's Highland Brigade in double company columns.
- 3 Col. Goodenough's six field batteries (9, 13 and 16-pounder).
- 4 Connaught's Brigade of Guards.
- 5 Ashburnham's 4th Brigade, Duke of Cornwall's Lt. Inf. and the King's Royal Rifles.
- 6 The Cavalry Division.
- 7 Macpherson's Brigade.
- 8 Nubian (Sudanese) sector.

wheeled transport, mules were bought from sources as far afield as America, Natal, and India. Altogether 41,000 tons of supplies and 69 troopships were gathered to move 30,000 men, half of whom had a 3,000-mile sea-voyage from England to Alexandria.

The organizational impetus behind this activity came from the Adjutant-General—Lieutenant-General Sir Garnet Wolseley. 'All Sir Garnet' had even become cockney slang for 'all correct' and the Press took up Disraeli's accolade of 'our only general'. The public (as a later one would regard Field-Marshal Montgomery) saw in him the guarantor of certain success. Again, like Montgomery, Wolseley had his chosen team which served him on campaign after campaign. For Egypt, eight members of the 'Wolseley Ring' took the cream of the staff and Cavalry Division appointments. Unfair though this might be, it placed men who knew their chief's mind into the key subordinate posts.

Sir Garnet embarked at the Albert Docks on 1 August, evading a frantic request from the Prince of Wales to accompany the expedition. Within a fortnight he was in Alexandria and a week later most of the army had arrived.

Wolseley only put his second-in-command and the Navy in the secret. Years before, he had remarked 'The Press has become a power which a man should try to manage for himself'. He now put these words into practice and held a press conference. Accordingly the swarm of war correspondents feverishly wired London to announce the imminent third Battle of Aboukir. On the afternoon of 19 August eight ironclads and 17 transports dropped anchor in the bay. At dusk small craft closed the shore to open fire while the main force sped away under cover of darkness, bound for Port Said, 150 miles to the east. Back in Alexandria, journalists were dashing off their stories of 'the great bombardment'.

On 20 August the entire 107-mile length of the Suez Canal was seized by naval landing parties starting from both ends—Port Said and Suez. All went beautifully to plan. The Egyptians had been dissuaded (for just long enough) not to destroy the canal by the protests of its resident builder. He was Ferdinand de Lesseps, who stuck firmly to the French government's policy of neutrality. At Port Said marines captured the Egyptian garrison asleep in their barracks.

Cairo was then telegraphed by the landing force to announce that 5,000 troops had been put ashore. But it was another ruse to cover the slow British build-up. That evening, guided by fast Thornycroft torpedo boats, the first troopship reached Ismailia, 40 miles from Port Said. This brilliant *coup de main* stands in marked contrast to the disastrous 1956 Suez expedition, yet was achieved in the Victorian steamship era.

The news of the landing at Ismailia was quite unexpected by Arabi and his puppet government. By calling up all the reserves, however, his total strength reached 60,000 troops, of whom 12,000 were sent out to Tel-el-Kebir, between Cairo and Ismailia, to face the threat from the canal, while

Water Canal and its accompanying railway, towards Cairo 96 miles away, and so come between the capital and Arabi's force around Alexandria, 120 miles distant.

Disembarkation of the main British force at the wooden pier took a long time. Only three big ships could dock at a time and some regiments on the later ships in the convoy had to wait several days, sweltering while the vessels lay at anchor, before going alongside. On landing the men, and more particularly the horses, were found to be very soft and unfit after their four weeks on board.

As a result, the advance along the canal and railway was slow, being carried out by brigades as they and their supporting troops disembarked and moved out of the base area.



Mary Evans Picture Library

25,000 were added to the army around Alexandria. Arabi, now certain that the main threat was coming from Ismailia and the east built a great 6ft by 10ft trench at Tel-el-Kebir, 30 miles west from Ismailia and 45 miles north-east from Cairo. Its right resting on the Sweet Water Canal and so, to a certain extent, difficult to outflank, the trench stretched northward for over four miles—a small enough distance in the great desert but, linked to the canal and the natural line of advance for an enemy, it was tactically sound.

The mass of *fellahin* living in Lower Egypt got their living from canals. Their knowledge and experience in making banks, draining waterways and general construction of earthworks now stood them in good stead. The results of their two weeks' labor were incredible. Not only was the main position dug, but also three covering positions in front, which were to act as successive defensive outposts covering Tel-el-Kebir. There is no parallel in military history of such vast and improvised fortifications being so speedily constructed.

Wolseley's plan was to move from the canal at Ismailia westward across the desert along the line of the Sweet

Probing forward along the railway to find the enemy, a series of major advanced guard actions took place for the next fortnight. It took 17 days to advance 25 miles. This advance successively captured each of the three enemy outpost positions built to protect the great Tel-el-Kebir fortifications. The final line was secured on 26 August with the capture of Kassassin, 11 miles east of Tel-el-Kebir. Two half-hearted sorties by Arabi had also been driven off.

By 12 September Wolseley had assembled the whole force in and around Kassassin. The railway up from Ismailia was repaired; stores, food and ammunition were being brought up by train, no longer by mule-drawn railway wagons. The canal banks broken by the retreating Egyptians were rebuilt, abundant water became available and although the troops had to work hard they were not continually on the move and had time to get acclimatized.

Wolseley now had available five brigades with a total of 17 battalions, making 12,124 infantrymen. Six cavalry regiments (2,785 troopers) and 61 guns brought the total up to 17,401 men. Arabi had 20,000 regulars waiting in the great trench with 6,000 Bedouin and 2,500 cavalry. There

were 75 Egyptian guns, including 60mm and 80mm Krupp breech-loaders.

For four successive days Wolseley had personally made a dawn reconnaissance and had noted that the enemy did not 'stand to' in the main position of Tel-el-Kebir until 0545. He therefore decided on a night advance across the desert and at first light to rush the enemy position before they were alert, or possibly even awake. The order of march had to be the order of battle, for there would be no time to deploy for fighting.

As Sir Garnet himself remarked, a night attack was 'a new thing in our military annals'. His subordinates were aghast. Colonel Redvers Buller VC warned that he could not remember a battle where redcoat had not fired at redcoat in *daylight*! But a frontal attack against enemy entrenchments two miles in depth across ground virtually devoid of cover presented no other solution. Wolseley explained: 'I know what the best troops feel and do when suddenly surprised at night; a surprise means panic, and a panic under such circumstances means a general stampede, and the side which is sufficiently well drilled, disciplined, and handled to enable it to make an attack at night will generally succeed,

along the whole line. The Cavalry Division on the extreme right flank was commanded by Major-General D. C. Drury-Lowe, who had under his command a composite regiment of the three household cavalry regiments, the 4th and 7th Dragoon Guards, and an Indian Cavalry Brigade. In support were two batteries of the Royal Horse Artillery (18 guns).

On the left of the canal marched the Indian Brigade, four battalions including the Seaforth Highlanders. They were an hour behind the main force, in case this more inhibited area betray the British movement, for this brigade's line of advance lay along a valley in which were marshes, orchards and a few native huts. North of the railway the ground was hard and sandy, with few obstacles of any sort. On the railway itself sailors of the Naval Brigade manned an armored train carrying a 40-pounder gun.

By 2300, all units were ready at their starting-points west of Kassassin; connecting files were in position, telegraph-pole direction posts erected, and Lieutenant Rawson RN, well accustomed to navigation by the stars, was ready by the right-hand man of the Highland Brigade. Wolseley had ridden round to see the troops forming up and impressed on commanding officers the necessity of absolute silence.



Furious hand-to-hand fighting rages between Highlanders and Egyptians in one of the artillery redoubts. Though surprised, the defenders fought briefly but bravely for half-an-hour as long as the issue was in doubt. After that they went home.

whether the enemy be surprised or not'.

The army was in two divisions. On the right, the 1st Division was led by Lieutenant-General G. H. S. Willis. His leading brigade—the 2nd—consisted of four battalions. In the second line came the Guards Brigade, commanded by the 32-year-old Duke of Connaught, Queen Victoria's third and favorite son, 'burnt as brown as a saddle'.

On the left, the 2nd Division was commanded by Lieutenant-General Sir Edward Hamley. His leading brigade of the Black Watch, Gordons, Camerons and the Highland Light Infantry (HLI) was commanded by Major-General Sir Archibald Alison, a one-armed veteran of the Crimea and the Indian Mutiny. Behind the Highland Brigade came the two battalions of the 4th Brigade.

In the gap between these right and left columns rolled the 42 horse-drawn field-guns, though well back between the 4th and Guards Brigades. They were not only placed to support the infantry, but acted as a central pivot for their march and would prevent any possible panic from spreading

Rifles were unloaded so no shot would spoil surprise. The men lay down until 0130 and camp fires were left burning. The advance went very satisfactorily, the precautions to preserve distance, interval and direction worked well and by 0300 the force was slightly ahead of its time-table.

An order to pause for 20 minutes was given to the Highland Brigade and the 2nd Brigade, but this order, whispered down the line, took some time to reach the flanks of both brigades and the outer units lost direction veering slightly inward. By the time the order did arrive at the far ends of the line both brigades were in crescent formation, facing inward and on moving forward again, in danger of meeting its opposite number face to face! Fortunately this loss of direction by the flanks was discovered and units were brought back on to their proper alignment before the advance was resumed.

The advance continued and by 0450 the Highlanders were unknowingly approaching the enemy trench. Just at that moment a light was seen in the east, an hour before

sunrise. Wolseley riding ahead of the phantom army looked at his watch in disbelief. Then he realized it was only the tail of a comet which lay below the horizon. Astronomical tables had not predicted this event. As the stars set they had shifted to the north-west and the British columns faithfully followed suit. This was a stroke of fortune for the error of 7° took the troops past a forward redoubt, 500 yards from the main line which reconnaissance had not spotted. Furthermore a west-to-east wind blew the sound of tramping feet and hooves back into the desert.

At 0455, Egyptian sentries fired one or two individual shots. Then a blaze of fire burst from the whole line of the parapet. The Highland Brigade was only 150 yards short of their objective, while on the right the 2nd Brigade, which had lost a little distance, was 800 yards from the enemy.

Out on the right wing of the Highlanders, Wolseley dismounted to take a closer look through his fieldglasses, leaving his brother to hold his horse. The first Egyptian shell dropped between Sir Garnet and the horse, but did not explode!

When the concentrated fire was opened against the Highlanders they fixed bayonets. The bugler with Maj.-Gen.

On the left of the brigade the HLI had been unable to reach the top. The trench here was held by a Nubian regiment, the best troops the Egyptians had, and they not only drove off the HLI but actually advanced out from their cover to attack them. The personal example of Generals Hamley and Alison was needed to counteract the panic cries of 'Retire!' The bagpipers' 'March of the Cameronians' helped renew the assault. On the right, the Black Watch had met much opposition but succeeded in capturing the front enemy trench.

Out on the right the 2nd Brigade arrived at the enemy position 15 minutes later than the Highlanders. In spite of the opportunity that the firing on their right had given them to prepare for the attack, the enemy made little effort to resist the Irish Fusiliers, Royal Irish, and York and Lancaster regiments. After only some minutes these regiments poured over the front trench with few casualties, while the fourth unit of this brigade, the Royal Marine Light Infantry Battalion, captured their section of the objective without firing a shot or a man being hit.

By 0520 it was light enough for the British artillery to move. Two batteries of guns were pushed forward in the



Col. Ahmed Arabi Pasha

Conscripted at the age of 14, Arabi became a lieutenant colonel at 20. His position in the Khedive's guard gave him the chance to launch a nationalist coup d'état. He was tried for it and exiled to Ceylon until 1901.



Lt.-Gen. George H. S. Willis

Commander of 1st Division, he entered the army in 1845 and had last seen action in the Crimean War. His younger CinC, Sir Garnet Wolseley, described him as 'a very plucky fellow personally, but an alarmist.'



Lt.-Gen. Sir Garnet Wolseley

Tel-el-Kebir earned the 49-year-old CinC promotion, a barony, and a £30,000 grant. So great was the prestige gained that in 1883 he put paid to the Channel Tunnel project for a century, on security grounds.



Lt.-Gen. Sir Edward Hamley

Commander of 2nd Division. Best known for his book on 'Operations of War' (1866), on the strength of which he had got command. He never forgave Wolseley for duping him over the Aboukir feint; also fell out with Willis.

Alison sounded the charge. It was taken up by the regimental buglers, and the position was rushed. Soft sand on the outer slope of the parapet slightly impeded the troops and 200 casualties were caused by enemy fire at point-blank range. The first man to reach the top, Lieutenant Brooks of the Gordon Highlanders, was shot dead but the Gordons together with the Camerons reached the top and pouring down into the main trench quickly cleared it. Gunners in the artillery redoubts were bayoneted in the back serving their guns. Pressing on, the Highlanders assaulted the second line in isolated parties, and were there held up by rifle fire from troops with a few extra minutes warning.

gap between the two leading infantry brigades and, reaching the great trench crossed it, forming up facing south. From here they enfiladed the enemy in his support position and from which he was obstructing the Highlanders' further advance. This artillery attack from the flank greatly shook the enemy on the lower right half of their main position and their units started to disintegrate. The HLI were able to get forward and crossing the trench joined the Camerons and Gordons, and with them wheeled left down to the canal clearing the enemy from the defences.

The 2nd Brigade re-formed and advanced in close order, followed by the Guards Brigade, both formations wheeling

left after crossing the enemy trench, round the outer flank of the Highlanders. The cavalry then came in from the north, sweeping the fugitive Egyptians before them, and the collapse of the enemy was complete. It was now 0600 with the new dawn just ten minutes old.

The Indian Brigade, on the left of the canal, had advanced more slowly than expected, largely because of the difficult country there. However, they too succeeded in capturing, almost without loss, the enemy outpost near Tel-el-Kebir station, and arrived there just as the HLI came down from the north with the Camerons and Gordons.

Now the cavalry cut loose on both flanks. A Canadian recalled the terrible aspect of the Sikh lancers, 'swarthy bearded faces, fierce with the lust to kill and intoxicated with the easy victory'. On the right the British cavalry were more gentle, often only using the flats of their sabres on the fleeing *fellahin*.

By 0700 Sir Garnet was meeting his generals at a stone bridge over the Sweet Water canal—the prearranged rendezvous two miles from the Egyptian front line. Sitting on the stone parapet, Wolseley smoked six cigars while dictating his victory despatch and making arrangements for a ruthless non-stop pursuit to Cairo and Zagzig, Arabi's home town—a key railway junction in the Delta.

The exhilaration of headlong chase kept the cavalry going. By 1600 they entered Zagzig, 18 miles from the battlefield. At the station they hijacked six trains crammed with fugitives; only one engine tried to steam away but taking the wrong track crashed into an oncoming locomotive! At dusk on 14 September the cavalry had reached the outskirts of Cairo—they had galloped 64 miles in 30 hours, Lieutenant Colonel Herbert Stewart went forward with just 50 troopers to summon the capital to surrender. A dispirited weeping Arabi, who had arrived huddled in a railway carriage boarded at Belbeis, had no fight left in him and came out to yield up the city.

'Devoured by mosquitos'

Sir Garnet 'devoured by mosquitos' in Zagzig managed to enjoy the Duke of Connaught's claret at the station. Next morning he left by train for the capital with Col. Redvers Buller in the driver's cab. Before midday on the 15th the victor was in Cairo and telegraphing the War Office that no more troops were needed. On 25 September the Khedive was rethrone by the British with great ceremony. A huge triumphal parade through the streets and a further Grand Review were held to impress the populace. On 21 October Wolseley and his two divisional generals sailed for home.

At Tel-el-Kebir, Arabi's great earthwork can still be easily traced. Because of the sandy soil the Egyptian fortification was a built-up breastwork often 6ft high—a narrow wall behind which the riflemen had cover from fire. The remains of this obviously man-made ridge, stretching endlessly across the desert, are today only 3 or 4ft high and they would not be noticeable were it not for the hollows immediately in front from which the soil to build the parapet was excavated. Ninety years of sand-storms have partly filled these hollows, and the parapet itself has mildly subsided, but the outline is unmistakable.

Occasionally there is a parados (rear facing earthwork) but, like the Boer trench at Magersfontein, there are no communication trenches and no traverses. It is evident that the number of man-hours needed to build this vast four-mile earthwork, with its three forward positions, was prodigious, while the collection and distribution of the tens of thousands

of spades, picks and entrenching tools must have been a major administrative problem.

The only reserve trench follows an unusual pattern. Joined at its northern end to the main trench it diverges back from it, southward, at an angle of 45°, and at its lower end, where it almost reaches the railway, is more than a mile behind the front line. Tactically this reserve trench is not good. At its northern end it could be, and was, overrun in the initial assault, while at its southern end it was so far back that it gave the Highland Brigade both time and ground in which to re-form for the second phase. It seems surprising that any army which could show such ingenuity and industry for so many days could within an hour give up the work which it had so laboriously and efficiently built for itself.

A triumph of planning

The ground all around, contrary to expectations, is hard-packed sand, with countless myriads of small pebbles. Walking is easy but the ever-present folds in the ground, of tennis-court or football-field size, make direction-keeping difficult. There are no trees, scrub or vegetation of any sort, no major features other than shapeless ridges and hollows, and it is frequently necessary to check bearings and direction, even in broad daylight, with the railway line clearly seen in the distance. The march of Wolseley's force for 11 miles in this featureless country in the dark was a triumph of planning by the staff and of execution by the regimental officers.

Standing in the trench today and looking due east, into the dawn as the Egyptians had done, it is easy to see how the British were practically invisible, frequently hidden by the folds in the ground. But the noise of thousands of men moving on the hard sand with their boots constantly kicking against the pebbles must have been considerable, and it says little for the vigilance of the enemy that they did not detect the British advance sooner.

In front of the enemy's extreme right the ground is a little flatter and there are fewer folds than elsewhere. It is not difficult to see why the HLI crossing this open and almost flat area, failed temporarily against Arabi's best troops.

Farther to the enemy's left and about where the Camerons and Gordons attacked, the ground rises through its folds quite sharply up to the trench and these regiments must have been quite breathless when, after charging up-hill, they had also climbed the soft-sanded parapet after negotiating the excavated hollows in front.

In the lower ground between the front and the reserve trench the Highland Brigade had ample opportunity to re-form, although every square yard is under observation from the reserve trench. It is surprising that the enemy in the second position, now fully alerted and with the Highlanders in full view, was unable to interfere with or even delay their second advance.

The greatest asset of a dawn attack, surprise, had long since gone. The dark kilts and scarlet jackets must have shown up clearly against the sand and in the growing light. The enemy's morale or ability must indeed have been poor, in that they so quickly ceased resistance to the second advance and allowed the British such an overwhelming victory.

The seeds of the disaster at Magersfontein in South Africa during the Black Week of 1899 at the beginning of the Boer War, were sown at Tel-el-Kebir in 1882. In each case a British formation in close order advanced by night across a

▽ A private of the Black Watch Highland Regiment. His rifle is an 1876-pattern .45 Martini-Henry Mk. 2 single-shot breech loader with a maximum range of 1,000 yards. At Tel-el-Kebir each man had 100 rounds of ammunition.

▽ ▷ A Sudanese (Nubian) rifleman of 1882. His weapon is the contemporary .43 US Remington, whose novel rolling-block action had a less strong cartridge ejection than the more reliable Martini-Henry, which could fire 15rpm.



Malcolm McGregor

desert to attack an entrenched enemy at dawn. On both occasions a preliminary engagement had pushed the enemy out of a forward position, the Egyptians from Kassassin, the Boers from Modder River. In each case several days elapsed after the first action, during which the enemy's main position was prepared to receive attack. In each case the Highland Brigade led the night advance across the desert.

The most striking similarity between the two battles lay, however, in the personalities of two officers who were present at both. At Magersfontein in 1899, the commander of the division was Lieutenant-General Lord Methuen. At Tel-el-Kebir he had been a colonel on Sir Garnet Wolseley's staff and had played some part in the preliminary reconnaissance, the planning of the night advance across the desert and the dawn attack. Seeing its complete success he became convinced of the superiority of trained disciplined British troops against untrained and ill-led semi-irregulars. To him the position after pushing the Boers off the Modder River line seemed so very similar to that after the driving of the Egyptians out of Kassassin, that he slavishly copied Wolseley's plan. He ordered the Highland Brigade to

advance in silence en masse by night across the desert.

The other veteran of Tel-el-Kebir was Captain Andrew Wauchope, a company commander in the Black Watch. At Magersfontein, now a Major-General, he commanded the Highland Brigade. He too had seen the success of the earlier night advance and dawn attack. The overwhelming success of the operation in Egypt had so greatly influenced both Methuen and Wauchope that their appreciation of the difficulties and risks of a night advance had become dimmed because of one easy success.

Here all similarity between the two engagements ceases and two essential contrasts emerge. Wolseley made several intensive personal reconnaissances of the enemy position at Tel-el-Kebir, particularly noting the time and manner in which his enemy manned their defenses in the early morning. He saw that the sun was over the horizon before they 'stood-to'—and also that it was then directly in their eyes. The enemy's position could easily be seen, and detailed objectives were allotted to sub-units. Neither Methuen nor Wauchope went forward to observe Magersfontein nor were cavalry sent out to reconnoitre.

The second essential difference between the two battles lay in the quality of the enemy. At Magersfontein the Highland Brigade faced the greatest marksmen in the world. The Boers of the Transvaal and the Orange Free State intensely hated the English—the Imperialists. They fought patriotically, fanatically and brilliantly. Trained from earliest boyhood to live in the saddle, they killed their game for food by the rifle while still mounted and were considered by Sir Winston Churchill to be the finest armed horsemen the world had ever known.

Ominous sign of disaster

The Egyptians at Tel-el-Kebir were largely untrained, unorganized, easily frightened, and not at all sure of what was going on. Even Wolseley referred to prisoners as 'these poor old creatures'. Their fear was increased when during the night the Great Comet was seen in the sky. They took this totally unexpected apparition as being an ominous sign of disaster ahead, and as they disintegrated during the battle, said to each other 'what else could one expect, after such a warning in the Heavens.'

The warning was apt enough, for Tel-el-Kebir cost Arabi's men 2,000 killed and unnumbered wounded as against a British loss of 57 dead and 382 wounded. Before the battle Sir Garnet had predicted 500 casualties as the price of taking the great trench—the actual count came to 480. Still more remarkable was that even before leaving London Wolseley had fixed on Tel-el-Kebir as the future battlefield and 16 September as the decisive day. It was this sureness of touch and almost mathematical precision in a campaign unique for its record of total competence that marks out Tel-el-Kebir as the best organized Victorian 'little' war. Between 1856 and 1914 it was the nearest the British Army came to fighting a regular army with modern weapons.

In no sense was Tel-el-Kebir one of the 'decisive battles of the world'—but it ushered in British rule in Egypt, which lasted for seventy years. Great Britain became the paramount and occupying Power; she could have annexed the country as easily as she had annexed so many others.

Sitting astride the canal, occupying Lower Egypt and therefore controlling the whole of Egypt, she was in full and almost undisputed possession of perhaps the most important strategic area in the world.

Howard Green

OERLIKON

Designed by Swiss gunmakers; easy to manufacture and fire. A gun used by both sides in World War II in the air, on land and at sea

What was the secret of the Oerlikon? Briefly, simplicity and reliability. Strictly speaking, there was no secret about it; anyone who could read could study the patents, and anyone who bought one could take it to pieces to find out how it worked. The mechanism of the Oerlikon was so simple that many people can scarcely believe it even now. It was a blow-back gun, working on the same principle as a pocket automatic pistol or most submachine-guns. There were no involved mechanisms—just a brilliant idea combined with a lot of technical skill.

The air forces of the warring nations turned, in 1915, from being mere information-gatherers to more aggressive roles and, as a result, the arms manufacturers found a new outlet for their products. For the lighter aircraft, the machine-gun, in one form or another, became the standard weapon, but for heavier machines—such as the German Zeppelin, or the heavy bombers which were beginning to take shape on the drawing boards—something bigger was needed. This led to the development of a number of cannon and heavy machine-guns. Most failed to live up to their promise. But one, the Oerlikon, did.

One of the weapons designed to meet the demand of the heavier aircraft was a heavy machine-gun invented by two brothers named Condens, employees of the *Stahlwerke Becker* of Reinickendorf in Germany. Their 'cannon', as they termed it, was of 19mm calibre and fired a small high-explosive shell fitted with an impact-fuze sensitive enough to detonate on hitting aircraft or balloon fabric.

The Condens' weapon was patented by the Becker company and became known as the 'Becker Cannon'. By 1917 manufacture was under way. It is not known exactly how many were made or where they all went; some reports of the Allied Disarmament Commission state that 362 guns were discovered after the war, almost all of which were cut up for scrap in 1920—so a genuine Becker is now hard to find. Some were certainly used on Gotha bombers, and apparently 131 of them found their way into the artillery to be used as anti-aircraft machine-guns.

With the end of the war in 1918, further manufacture and development by the *Stahlwerke Becker* was prohibited by the terms of the Versailles Treaty (1919), so the patents were sold to a small firm in Switzerland, the *Maschinenbau AG Seebach*. The new owners did some more development work, changing the calibre to 20mm in the process, and eventually put the gun on the market as the 'Semag-Becker Cannon', a lightweight infantry support gun mounted on a two-wheeled artillery-type carriage. But 1922 was a poor year to enter the arms trade—the 'war to end wars' had just finished, and the major armies were running down to peacetime levels. There was no money for experimenting and precious little interest either. After a short struggle, the *Maschinenbau AG Seebach* folded and went into liquidation in 1924.

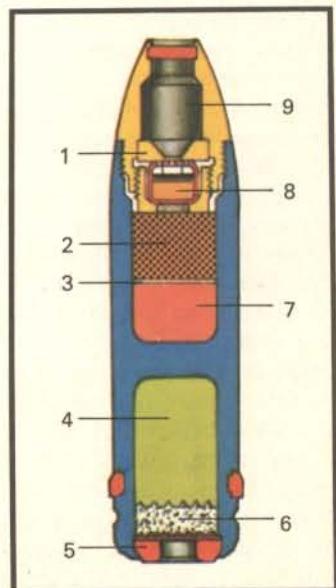
But the Becker Cannon was too young to die. In 1923, another German company, the *Magdeburg Werkzeugmaschinenfabrik*, had taken over most of the share capital of the *Schweizerische Werkzeugmaschinenfabrik* in the Swiss town of Oerlikon. Foreign ownership meant that it could no longer be called *Schweizerische*, so the name was changed to *Werkzeugmaschinenfabrik Oerlikon* (Oerlikon Machine Tool Company) and in 1924 the new owners appointed an engineer named Emil Georg Bührle to take charge, organize and run the new acquisition.

Bührle was quick to appreciate that machine tools alone were not a sufficient basis for production, and he looked around for something else to occupy the factory. His eye fell on the nearby, and recently closed, Seebach company. Although Seebach had had little success, Bührle felt that the Becker Cannon was worth persevering with. He bought the patents and the few weapons which the defunct company had made, and hired most of the technicians who had been working on the gun. Before the end of 1924 he had managed to sell a few guns in Finland and Mexico, and he followed this up by more sales in South America and Europe, so that he was able to keep a small production line running. His markets were mainly small nations who had not been involved in World War I and who were not, like the major powers, overstocked with wartime productions.

His other markets lay in the emergent European countries such as Poland and Czechoslovakia who were trying to build up armies from scratch and impose some sort of order on the assorted weaponry left on their territory when the war ended. In 1929 the breakthrough came with an order from China for 120 of the new 'Oerlikon Guns'. In this year,

A MkII shell with high explosive, incendiary and tracer. All shells have a tracer composition though some are simply tracers. The inclusion of incendiary in the high explosive compound gives a very high explosive temperature—effective for igniting petrol within the target.

1 Rear disc
2 High explosive filling
3 Waxed cloth disc
4 Tracer composition
5 Base plug
6 Priming composition
7 Incendiary filling
8 Detonator
9 Compression ignition fuse



► Oerlikon MkII: Overall length 8ft; Weight (gun only) 150lb; Weight of MkIIA mounting 1,146lb; Calibre 20mm; Rate of fire 465 to 480 rounds per minute; Muzzle velocity 2,725ft per second; Magazine capacity 60 rounds; Maximum range at 45° elevation 6,250 yards; Effective range 1,000 to 1,200 yards.

We are grateful to the Quality Assurance Directorate (Weapons), Royal Small Arms Factory, Enfield, for information supplied for this article.

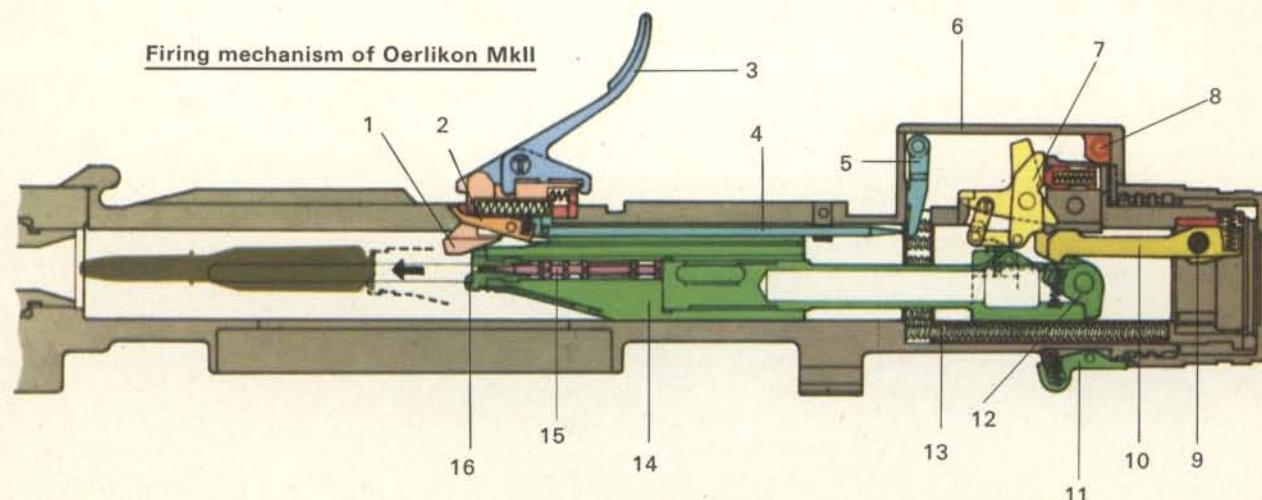
▼ MkII's firing mechanism:

- 1 Ejector
- 2 Magazine interlock lever
- 3 Magazine catch lever
- 4 Magazine interlock rod
- 5 Magazine interlock fork
- 6 Trigger box cover
- 7 Parallelogram lever arrangement
- 8 Safety cam
- 9 Trigger
- 10 Trigger hook
- 11 Catch retaining grips
- 12 Sear
- 13 Trigger casing buffer springs
- 14 Breech Block
- 15 Striker
- 16 Lip on breech face piece

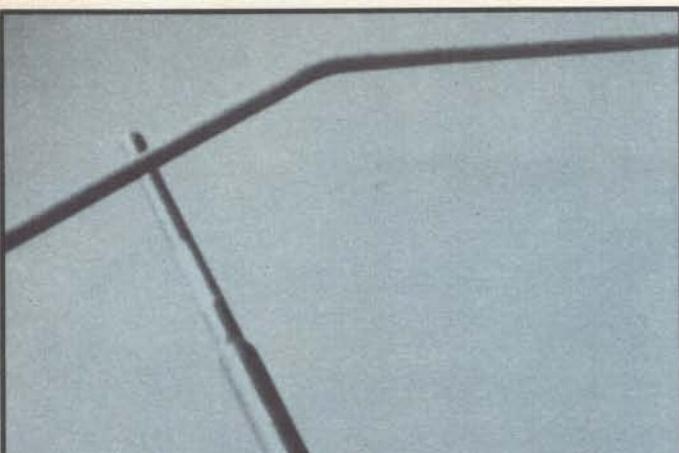


Sanson/Bryan

Firing mechanism of Oerlikon MkII



Sanson/Bryan



Imperial War Museum



Imperial War Museum

◀ Crusader MkVI cruiser tank equipped with twin Oerlikon anti-aircraft guns. The other Allied 'flak-tank' was the four-gun 'Skink', a modified version of the Canadian Ram tank. Allied air superiority late on in the European war diminished the usefulness of these anti-aircraft tanks.

too, Bürkle managed to acquire a majority holding in the shares of the company, and eventually, in 1937, he took over the remaining shares and reorganized the company as an entirely Swiss concern.

During these years the problem which the Oerlikon gun posed to many armies was simple—what to use it for. It was a fast-firing gun, too heavy to be a machine-gun and too light to be a field gun. The original Seebach idea of an infantry support gun failed to find favor; the shell was too light. Much was made of its potential as an anti-tank gun, and its high explosive shell was certainly effective against the tanks of the day, and a steel piercing shot could punch holes at will. In those days, though, the theory was that the enemy of the tank was another tank—and besides, an anti-tank weapon firing at 400 rounds a minute seemed to be overdoing it.

The only lightweight anti-tank gun that any army envisaged then was the anti-tank rifle, and the Oerlikon was far too heavy for that. People tried to adapt it as an anti-tank gun; the British Army bought a few and mounted them on little tracked trailers towed behind light trucks, but they were not very enthusiastic about the idea. Other people tried to make something of it; another Swiss company, also backed by a German-controlling interest, produced the Solothurn 20mm gun, and in Britain there was the 0.8in Elswick Machine Gun.

The people who finally solved the problem were the Germans, though they took supplies of the competing Solothurn gun—the power behind the Swiss company producing this gun was the *Rheinmetall* armament concern in Dusseldorf. The German Navy took the 20mm Solothurn and mounted it as a shipboard anti-aircraft gun, and suddenly everybody realized where the 20mm weapon was needed. The Oerlikon company had been trying to persuade people of this for a long time, but it needed some concrete example before the lesson went home.

The Solothurn fired at 300 rounds a minute and used a 30-round magazine; Oerlikon were not slow to point out that their weapon fired at 550 rounds a minute and used a 60-round magazine. Until this time the anti-aircraft gun was usually something in the order of a 3in artillery piece firing a 12lb shell some 10 to 15 times a minute and demanding a lot of men and technical backup to do it.

Hitting an aircraft with one of these was rare and most people were happy if they could get a near miss. Clearly it was much better to fire 45 third-of-a-pound shells in five seconds than a single 12lb shell in the same time. By spraying the shells about a little you might even hit something. Thus the idea of putting the maximum amount of metal and explosive into the air in the shortest possible time became the accepted way of dealing with low-flying, fast-moving aircraft.

With the German example before them, and the political

◀ 'Action stations!' A naval gunner prepares to fire. Another of the Oerlikon's crew has a fresh magazine ready. Over 35,000 MkIIs were produced for use on both land and sea. They equipped every ship in the Royal Navy, affording much-needed protection for Britain's vital convoys.

events of the early 1930s to spur them on, a rush for the Oerlikon developed. Lithuania, Czechoslovakia, Japan and others began buying Oerlikon guns in quantity; the only people who stood aloof were the major nations—Britain, the United States, Germany, Russia and France. They all had national arms industries of varying degrees of efficiency, and if there was anything in this 20mm idea, then these companies would consider the matter, perform some trials, build a few prototypes, do some more trials, and, one day, would offer a 20mm gun to their war departments.

None of the national arms industries, except the German, did. The simple fact was that Oerlikon had the best design securely sewn up with patents, and anybody who wanted to develop a new 20mm gun had first of all to invent some new method of operation. Secondly they had to reach a stage where they could rival the technical expertise which Oerlikon had amassed over 15 years.

The blow-back idea was not new when the Condens brothers designed their first cannon; it had been used since the turn of the century in small pistols. The basic principle is that the breech-block is held closed while the gun fires entirely by its own inertia, assisted by a spring. When the gun fires the force of the explosion not only drives the bullet up the bore, it also tries to blow the now-empty cartridge case back out of the chamber against the pressure of the breech block. Since the mass of the bullet is very small compared with the mass of the breech block, the bullet has left the muzzle by the time the breech inertia is overcome and the block starts to move back.

New concept in gun design

This principle is suitable for a pocket pistol firing a bullet weighing about 100 grains; the Becker cannon fired a shell weighing a third of a pound. Before this could have reached the muzzle, the breech-block, unless it weighed several hundred pounds, would have been opening, and the high pressure in the cartridge case would have ruptured it and stopped the gun. So the Condens brothers introduced a new idea into weapon design, a technique known variously as 'Differential Locking' or 'Advanced Primer Ignition'. They actually took the idea from the Deport Mountain Gun, a mountain artillery weapon developed in France just before World War I, where the problem had been similar; to reduce the recoil of the gun so that it could be made lighter by saving the weight of a complicated hydraulic recoil system.

In the Deport Mountain Gun the problem was overcome by hauling the gun back to the fully-recoiled position against a powerful spring, loading, and then releasing. As the barrel ran forward the cartridge was fired a split second before it reached the end of its run. As a result, the recoil of the shot had first to arrest the forward-moving mass, and then reverse the movement—adding these two resistances choked down the recoil by a considerable amount.

The Condens idea was simply to utilize the forward-moving mass of the breech-block instead of having the whole gun move. They arranged a fixed firing-pin on the front end of the block in such a way that when the trigger was pressed the block ran forward driven by a spring, collected a cartridge from the magazine, thrust it into the chamber, and then, before the block reached the fully-forward position, the firing-pin hit the cap and fired the cartridge. The explosion force on the case of the cartridge stopped the forward movement of the block and then reversed it, eventually driving the block back against a spring to recommence the whole action. By using this

system, the weight of the gun was kept down, the mechanism was reduced to one or two moving parts, and simplicity was assured.

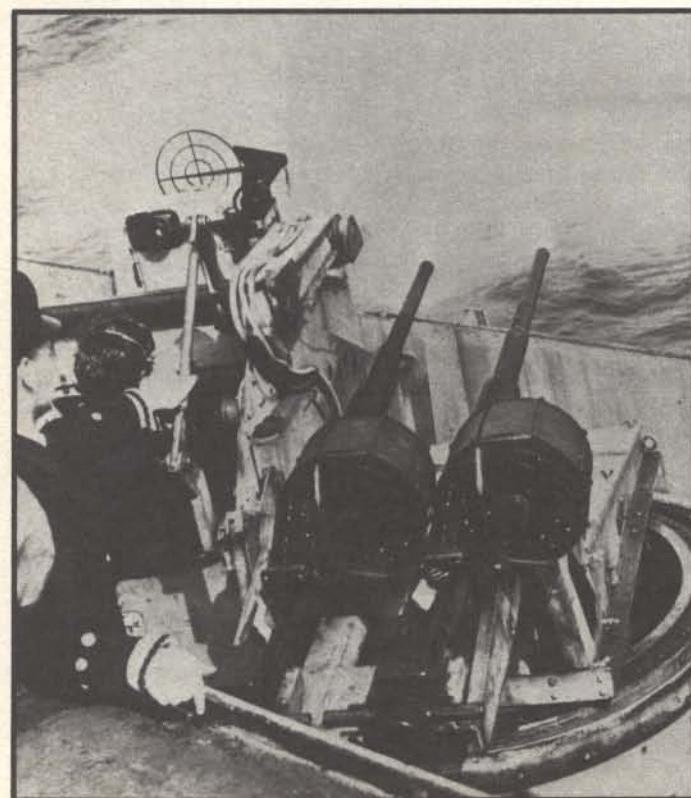
All it needed was the know-how—very careful experimentation to determine the correct weight of the block, the correct pressure of the spring, the correct combination of propelling charge and shot weight and the correct alignment of the cartridge to ensure it was fired at precisely the right moment in the cycle. As a safeguard, the cartridge case was reinforced internally so that even if the last fraction of the case was unsurrounded by chamber when it fired, there was still no fear of it bursting.

In later years Oerlikon made improvements on this system, making the breech block heavier by adding arms running alongside the chamber to a powerful coil spring around the barrel. They also made the front end of the breech-block small enough to enter the chamber behind the cartridge case to give more support at the moment of firing.

This then was the Oerlikon gun. Any other nation who wanted to invent their own cannon had to start out by doing some involved design and development work, because, unless Oerlikon's patents were infringed, they had to find another way of arriving at the same answer. The Solothurn gun did it by using gas tapped from the barrel, similar to some machine-guns, to unlock the breech, after which blow-back did the rest. The only other competitor, also Swiss, was the *Hispano-Suiza* company, and they too used gas operation. Between Oerlikon's design and the two others all the options were taken.

The result was that other countries had to go to Oerlikon.

Twin Oerlikon anti-aircraft guns undergoing tests on board the escort carrier Trumpeter. British interest in the gun dated back to 1937 and the first Oerlikons, slightly modified from the original design to give a slower rate of fire and a higher muzzle velocity, entered Royal Navy service in 1939.



Imperial War Museum

In 1937 the Royal Navy began discussions about a design of a light anti-aircraft gun for fleet use. The Navy knew what they wanted as far as velocity and rate of fire were concerned, and decided that an off-the-peg design was not suitable. The standard Oerlikon of the time fired at 550 rounds a minute and sent the shells out at a velocity of 1,968ft per second.

The Royal Navy wanted a slower rate of fire but a much higher velocity, since high velocity cuts down the time between the shell leaving the gun and arriving at the target, and consequently makes the aiming problem rather easier. After two years' work the 'Gun Oerlikon 20mm Mark I' entered British service, firing at 450 rounds a minute with a muzzle velocity of 2,725ft per second. The guns were made in Switzerland, and what with this order and orders from France and Holland for standard guns, the Oerlikon factory had to be expanded.

Oerlikon plans smuggled to Britain

No sooner was production under way than war broke out in 1939. For the first few months there was little difficulty in obtaining the Oerlikon, for shipments were made regularly across the Swiss-French border. But when the Germans overran France, Switzerland was cut off and deliveries to Britain ceased. Fortunately the Royal Navy had anticipated this, and at the last moment a naval officer left Switzerland with the drawings for the British Oerlikon gun, ran the gauntlet of the advancing German Army, and delivered them safely to Britain. After considerable problems production of the British-built 'Mark 2' began, and by the end of the war over 35,000 Oerlikon guns were manufactured. They were sent to equip every ship of the Navy, giving a formidable close-in anti-aircraft defense.

At the same time, approaches were made to the United States Navy for them to adopt the Oerlikon gun and build it in the USA. This would serve two purposes. First, it would give the US Navy a useful gun, and secondly it would ensure that production capacity would be set up in the USA, with Britain taking some of the output. It took a lot of talking to sell the idea to the Americans, but eventually they adopted the Oerlikon and began contracting for manufacture; by the end of the war American production had reached the quarter million mark, and over three thousand million dollars had been spent on guns and ammunition.

Meanwhile, the Oerlikon company had only one outlet for their products—Germany. Since the German Air Force wanted every 20mm gun they could get for both aircraft and anti-aircraft use, the Oerlikon was exported to Germany and eventually built there under license by the *Ikaruswerke Berlin*. Although the official German lists show 'large numbers' of Oerlikons employed, they were, in fact, never as widely or as effectively employed as they were by the Allies.

The Oerlikon gun of World War II is now a thing of the past. Weapon design never stands still, and modern aircraft speeds demand rates of fire and velocities which could not be reached by a blow-back gun, even one as efficient and ingenious as the Oerlikon. As a result, although there are still Oerlikon guns in production, they have moved on from the Condor-inspired design to more powerful and complicated mechanisms. But it is doubtful whether any present or future product of this Swiss company will ever be produced in such numbers or have such a distinctive service record as the World War II Oerlikon.

Ian Hogg

DIEN BIEN PHU

'We are impregnable, we cannot be shelled, we cannot be surrounded' said the French. But in 56 days Gen. Giap overwhelmed the fortress



The valley of Dien Bien Phu—an idyllic death-trap. Too small for maneuver, too large for tight defense; it was swept by accurate Communist artillery fire from the surrounding hills which rise to 2,500ft and dominate the 1,200-yard airstrip.

Dawn is about to break over the North Vietnamese airfields of Gia-Lam and Bach-Mai, just outside Hanoi in the north-east corner of Viet Nam. Over 1,800 French and South Vietnamese are ready in full fighting kit, tense and waiting to go into battle. With them are their three commanders, Major Marcel Bigeard, Major Jean Brechignac and Major Jean Souquet, all seasoned veterans of the Indo-China war. On the runway, 67 C47 Dakotas sit, their crews ready to take off. It is 20 November 1953.

Another Dakota, 190 miles away, is circling over a valley shrouded in mist and drizzle. Three French officers, Lieutenant General Pierre Bodet, Brigadier General Jearl Decheaux and Brigadier General Jean Gilles, are aboard. They will soon give the go-ahead for the dropping of three parachute battalions who are waiting to attack a small village held by the Viet Minh. It is the village of Dien Bien Phu.

Suddenly, at 0700, the sky clears. An order goes to the parachute battalions outside Hanoi. It is the beginning of Operation Castor. Over Dien Bien Phu, the swarming Dakotas fill the air with their roar and thousands of Thai peasants stare up in surprise. The planes discharge their cargoes of men, and hundreds of white parachutes blossom against the blue sky. Viet Minh soldiers rush to their battle stations. On the dropping zone (DZ) Natasha, a Viet Minh

company on exercise has already skirmished with Maj. Bigeard's paratroopers of the 6th Colonial Parachute Battalion. The DZ covers a large area and already the recovery of the tons of equipment parachuted into it is becoming difficult. Machine-guns, 81mm mortars and radio sets litter the ground. But many of the radios have not survived the drop. Worse, some of the mortars cannot be found.

Farther to the south, on DZ Simone, Maj. Brechignac's paratroopers, from the 2nd Battalion of the Parachute Chasseurs Regiment, has been dropped in difficult conditions and it is proving difficult to rally the soldiers and get them into action as a concerted force. Without waiting for support, Bigeard has left the DZ to attack the village of Dien Bien Phu with three of his four companies. But the Viet Minh regular soldiers defend doggedly. At 1500, Souquet's 1st Colonial Parachute Battalion, who have jumped in support of Bigeard, arrive to take part in the mopping-up action. The 148th Regiment of the People's Army withdraws in good order and the villagers flee into the mountains. French losses are only 13 dead and 40 wounded. It is confirmation of the value of surprise blows struck by well-trained parachute units.

On the second day, 21 November, a second force of paratroopers jumps into the valley of Dien Bien Phu. These

are the legionnaires of the 1st Foreign Legion Parachute Battalion and the soldiers of the 8th Vietnamese Parachute Battalion, with their commanding officers, Lieutenant Colonel Pierre Charles Langlais—who breaks a leg on landing—and Gen. Gilles, commander of the whole Dien Bien Phu operation. Heavy supplies are now dropped on DZ Octavie, but one of two bulldozers parachuted in buried itself in the ground after its chute had failed to open fully. The French forces on 22 November are 4,560 men, after a fresh battalion of Vietnamese had arrived. It was time to begin the construction of defensive positions.

After the airborne landing of 20 November, Dien Bien Phu is soon to be a fortified zone, capable of holding 12,000 soldiers. Why is it sited in such an area? Because the French High Command's patience is wearing thin. Embroiled in a war with Ho Chi Minh's revolutionary army since 19 December 1946, a spectacular victory is badly needed. And with Gallic daring, they have chosen to occupy Dien Bien Phu, a base 200 miles inside the enemy's territory.

What is the role of Dien Bien Phu?

The French High Command at Saigon is not sure about the role which Dien Bien Phu is being called upon to play. Is it a rallying point for the Lai Chau garrison? A 'hedgehog' in an essential strategic position? Or a start point for an offensive, as Major General Renee Cogny declares? Perhaps it is a trap sprung for the army of General Vo Nguyen Giap, of the Vietnamese People's Army. Or could it be a diversion in anticipation of an attack on the Red River Delta?

Before being replaced by General Henri Navarre, General Salan, Chief of Staff of the French Expeditionary Force in Indo-China, said that Laos could only be defended by holding Dien Bien Phu, as well as Na-San and Lai-Chau. Navarre will come under severe criticism for his action here in establishing Dien Bien Phu as a fortress, sited as it was in the bottom of the valley. But he saw the ten-mile-long and six-mile-wide valley floor as an ideal base. From it he could make sorties to attack the Viet Minh. He felt that the enemy could not surround his fortification, nor could they effectively use artillery against the airstrip from the hills ten miles away.

For some time, Dien Bien Phu is almost a tourist venue for many high-ranking French officers and politicians, together with their Government's military visitors. The fortress is praised from all sides, although one man, General Blanc, has his criticisms about the area in times of monsoon. His warning is not heeded. Among the visitors are General Spears, British Military Attaché and High Commissioner Malcolm McDonald, many American Generals including John ('Iron Mike') O'Daniel, US Army Commander in the Pacific. But none of these highly expert people question the ability of Dien Bien Phu to withstand attack.

There is a collective blindness on the part of senior French officers. And this notwithstanding the fact that the archives hold details of defense preparation, backed by information from the Deuxième Bureau on the movement and capability of the enemy forces.

But from December 1953, events will show that if Navarre has set the scene, it is Giap who will script it. The situation created by the French airborne landings at Dien Bien Phu on 20 November is analyzed by the Viet Minh Council of War. Orders are given to the 316th Division to attack Lai-Chau so that it will be compelled to fall back to Dien Bien Phu. But in December 1953 the French forestall

the Viet Minh plans. The Lai-Chau garrison is evacuated in 183 sorties by air transport four days before the arrival of the North Vietnamese troops. Over 2,000 men who had to be left behind have to try to make the 60-mile jungle journey to Dien Bien Phu on foot. But only 175 T'ai soldiers make it. The rest die in ambush. Many desert.

With the Viet Minh fallen back from Dien Bien Phu, the offensive and reconnaissance missions ordered by Gen. Cogny immediately begin to be costly. Two missions, Operations Ardèche and Régate, are undertaken by a paratrooper task force commanded by Lt. Col. Langlais. They leave the base to link up with the Laotian light infantry and Moroccan *Tabors* from Laos. The rendezvous is to be in the Sop Nao region, a mountainous area with thick jungle, providing perfect ambush sites. The task force is harried by a mobile enemy and the losses make it necessary to abandon these long-range penetrations and to concentrate efforts on the mountains that surround Dien Bien Phu itself.

In the fortress, information from French intelligence is that the 351st, 308th and 312th Divisions are moving towards Dien Bien Phu. Soon Giap is mobilizing his forces and the French are preparing for a siege. Their engineers calculate that enormous quantities of equipment will be needed—36,000 tons. This would take an impossible 12,000 Dakota trips from Hanoi. All the engineers get is 4,000 tons—and 75 per cent of that is barbed wire.

There is another battle between the French and the Viet Minh. It is one of logistics. And the French will lose this one too. All their fortification work is accurately mapped. It can be seen clearly from the surrounding high ground. The smallest trench stands out clearly in the bare earth. As for the French, they see nothing of the enemy's movements in the dense jungle. They do not know that 55,000 regular and locally raised troops surround them. Giap's forces open five routes through the jungle towards Dien Bien Phu. They are used by 600 Russian-built 2½-ton lorries which travel by night with all lights extinguished. The French air attacks on the passes of Lung Lo and Phadin cause sections of these precarious roads to slide into ravines, and torrential rains make fords impassable and turn valleys into marshes.

Conveyor belt of human ants

But traffic is never interrupted for more than a few days. Thousands of coolies work day and night maintaining the Viet Minh supply routes. In addition, on the narrow tracks pack-horses, mules and convoys of bicycles, each one laden with 220lb, head towards the battlefield. Nothing can stop this conveyor belt of human ants. But the fortress can count only on transport aircraft. Everything has to come from Hanoi.

Ten M24 Chaffee tanks stripped down (each requiring five C47s and two Bristols to lift them), 105mm and 155mm guns, rations for 11,000 men, generators, water-purifiers. But French airpower, even with the help of a squadron of C119s supplied by the Americans, could not meet the demands of Dien Bien Phu.

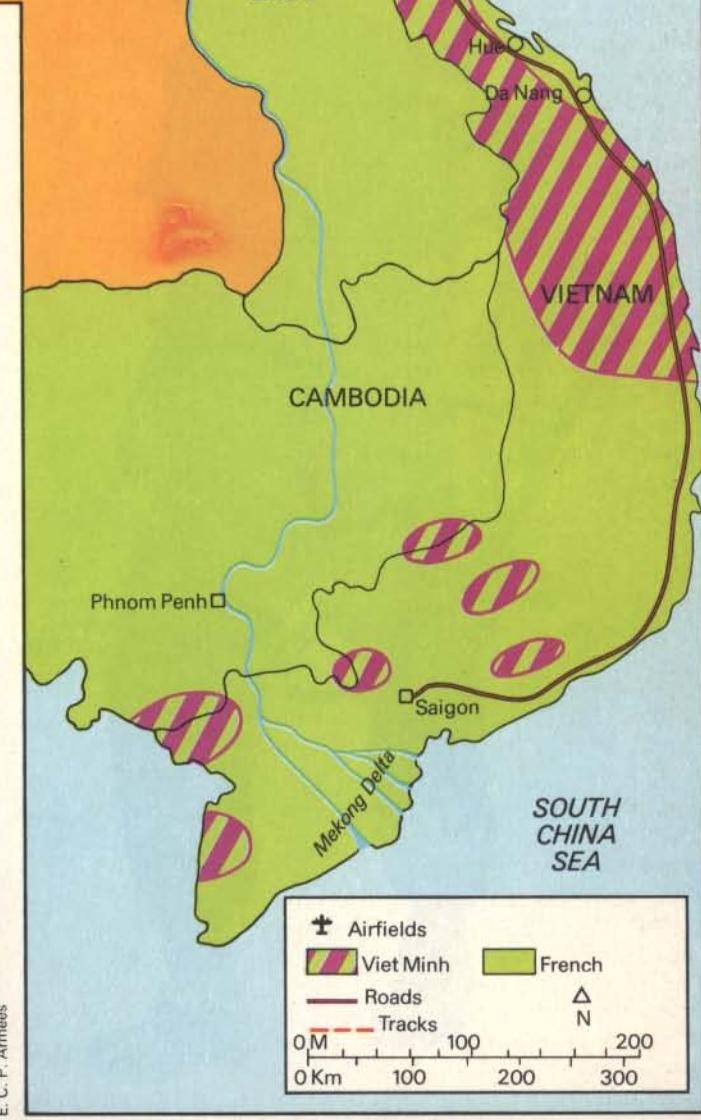
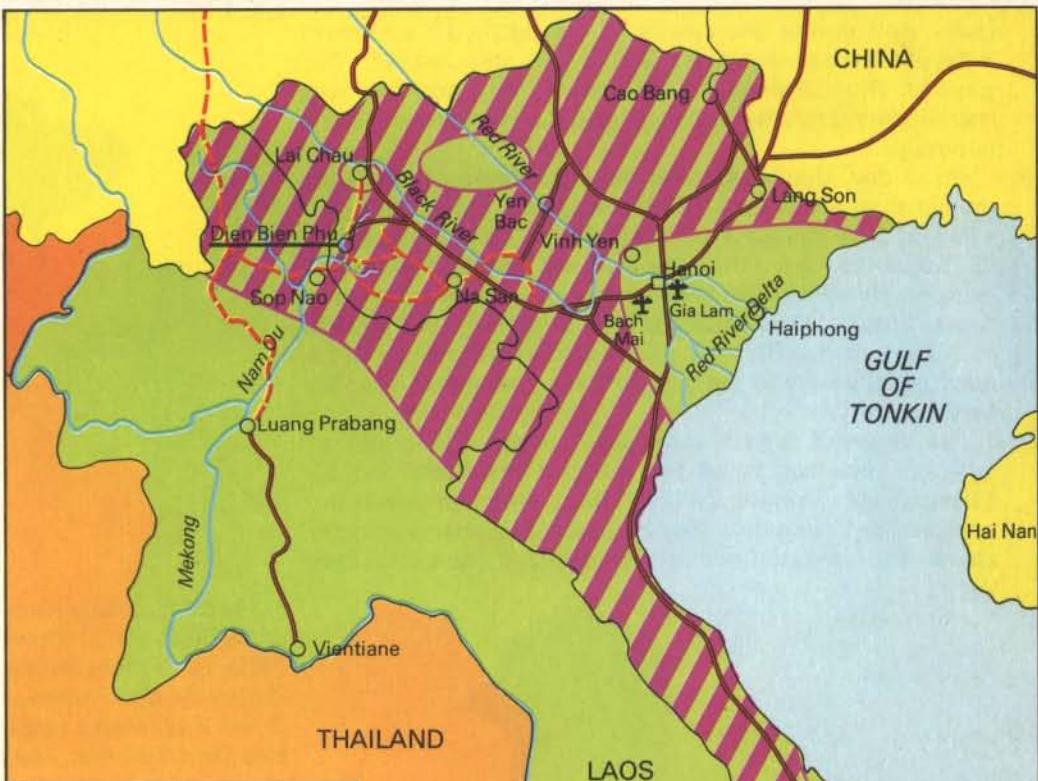
Even before the real trial of strength begins the French have lost the logistics battle. When the airstrip is destroyed and the parachute is the only means of supply, the consequences will be disastrous for the French.

Gen. Giap's artillery strength around Dien Bien Phu is impressive. On the day before the attack the besiegers have 144 field-howitzers (American 75s and 105s), 48 120mm heavy mortars, 30 75mm recoilless guns and 36 37mm AA



E.C.P. Armées

△ A 45-year-old Breton, Lt. Col. Langlais became Dien Bien Phu's real commander.
▷ Indochina 1953, showing the approximate areas held by each side. The seizure of Dien Bien Phu was a bold move to transfer the war to the Communist interior.
▽ Fourth day of the siege—16 March 1954. Men of the 6th Colonial Para make their second drop into the valley. The French parachuted 4,300 men into the base.



guns. And during the course of the battle 12 six-barrel Katyusha rocket-launchers will come into action. The physical effort of dragging these guns into place over wet and slippery slopes by human muscle power must have been enormous.

On D-day, Giap has at his disposal stocks of shells far greater than the French thought possible. From 13 March to 8 May 1954 his guns will fire about 150,000 shells, about 30,000 of them from the 105s. And the French artillery will need an air lift of incredible proportions to keep the guns firing. A total of 95,000 rounds of 105mm and 8,500 rounds of 155mm ammunition are parachuted into the base. But a quantity falls beyond the ever-shrinking perimeter into Viet Minh territory.

The besieged French have six batteries (24 guns) of 105 mm, one battery of four 155mm howitzers and 32 120mm heavy mortars. Colonel Piroth, who commands the base artillery, considers they can stop any enemy infantry attack, and are good enough for effective counter-battery

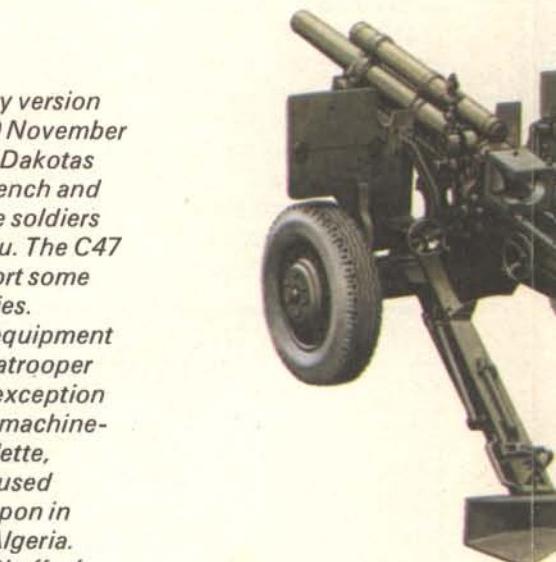


△ The C47, military version of the DC3. On 20 November 1953, 67 of these Dakotas dropped 1,800 French and South Vietnamese soldiers into Dien Bien Phu. The C47 could also transport some two tons of supplies.

◁ Almost all the equipment of this French paratrooper is American. The exception is his French sub-machine gun, 9mm Mitrailllette, MAT Modele 49, used as a standard weapon in Indo-China and Algeria.

▷ The US-built 'Chaffee' tank. Ten were dismantled and air-dropped into Dien Bien Phu. Well-armed with a 75mm gun, two .3 and a .5 Browning MGs, it was not sufficiently available.

Sanson/Bryan





△ The 105mm field howitzer used by the Communist 45th Artillery Regiment and four batteries of 2nd and 4th French Colonial Artillery. Max. range: 12,500 yards. Rate of fire: 4 rpm.



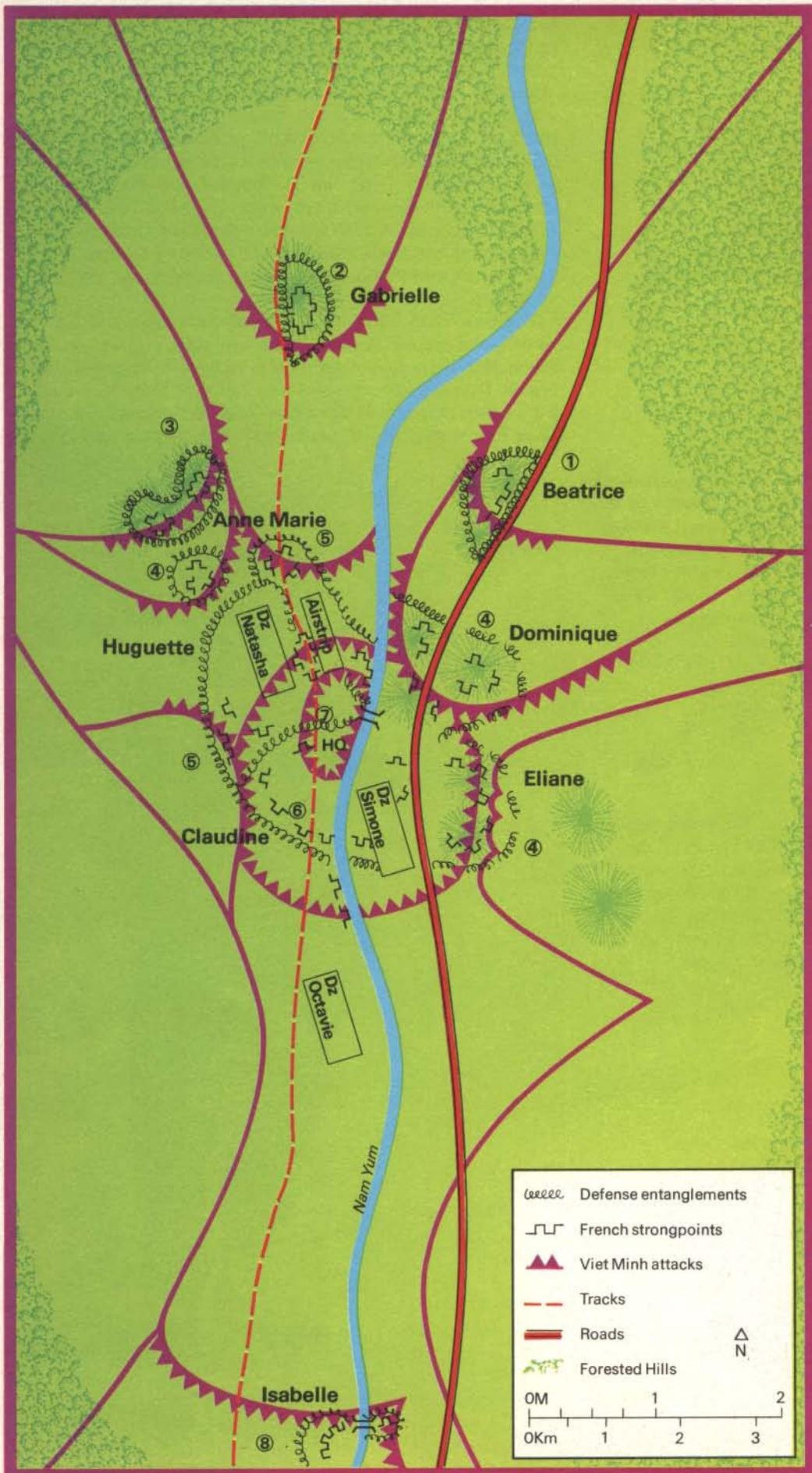
△ A Viet Minh regular, one of 55,000. Typically, he uses Russian-type 'ammo' pouches for the 30-round magazines of his captured US .45 M1 Thompson sub-machine-gun.

work. He said: 'No Viet Minh gun will fire three rounds without being destroyed.' The French have underestimated the enemy's artillery strength, the supply of ammunition, the skill of his gunners and the effectiveness of his camouflage.

But Dien Bien Phu's fire-power inferiority is also the result of other factors. Contrary to expectations the Viet Minh guns are served by excellent crews, trained in camps in south China. Their fire is directed and controlled by observers with uninterrupted views of the airfield and the unprotected French batteries. From the first day of the attack their power and their precision will come as a bitter shock. The French counter-battery work is random and will have no effect.

The Viet Minh 105s, in fact, are undetectable and practically invulnerable, because they are well dug-in, though this is at the expense of wide fields of fire and large handling crews. Dummy guns are used by the Viet Minh to deceive the French spotters in the base. And so the battle of Dien Bien Phu was going to start under unfavorable conditions





◀ The eight-week agony of Dien Bien Phu enacted round the three original Dropping Zones. General Giap overran the outlying strongpoints and cut off Isabelle from the main defended area. He then adopted 'the tactic of gnawing away at the enemy piecemeal.' French bravery could not make up for lack of reserves, an ammunition shortage, and diminishing rations, all air-dropped by C47s into a shrinking base.

- 1 Beatrice crushed in six hours (13-15 March).
- 2 Gabrielle fell after 28 hours fighting (15 March).
- 3 Anne Marie evacuated when psychological warfare induced desertions from the Thai garrison (17 March).
- 4 Dominique, Huguette and Eliane encircled by trenches and eroded by assault and mining (18 March-10 April).
- 5 Huguette. The battle of attrition forces Giap to pause, but hold most of the airstrip (11-23 April).
- 6 Claudine gets last patrol into the valley during a week's lull as Giap builds up for a general offensive.
- 7 Eliane and HQ fall (7 May).
- 8 Isabelle collapses after a vain breakout (8 May).



△ A mixed French and Vietnamese paratroop machine-gun team keep watch. Their squad weapon is a US calibre .30 Browning LMG—an air-cooled gun firing at 500rpm.

▽ Major Marcel Bigeard on his HQ radio—an SRC-300 set. Code-named 'Bruno' from 1939-45 French Resistance days, Bigeard was an irrepressible fighting commander who always counter-attacked whenever possible.



for the defenders. Their officers either know or sense it and it seems that Navarre and Cogny have their doubts. But by this time the die has been cast.

'Gentlemen, it is at 1700 tomorrow.' Colonel Christian de la Croix de Castries had just completed his briefing on the evening of 12 March 1954. The unit commanders have been waiting this moment for several weeks. Less than six miles away, Giap issues his final orders for the attack. He knows the importance of the battle and its cost: 'We will have to sustain losses in the course of the battle. Victory is bought at the price of blood and paid for, like all revolutionary conquests, with sacrifices'.

At D-day the attackers have a superiority of 8:1, there are only 6,500 French front line troops against the 50,000 seasoned combat troops of the elite 308th, 312th, 316th, 304th, the 351st (engineers and artillery) divisions and the 148th local regiment. The French have five Foreign Legion battalions, but eight others are composed of Algerian and Moroccan riflemen, Thais, Vietnamese, Montaguards and mobile police. On 13 March Viet Minh movements are spotted around *Beatrice* and *Gabrielle* strong points, as two regiments of the 312th Division move up to their start-lines less than 100 yards from the French defenses. Two C47s and a fighter are destroyed by artillery fire on the airstrip.

At 1715 the first 105mm shells land on *Beatrice* which is held by 3rd Battalion, 13th Demi-Brigade of the Foreign Legion. Two 105mm guns in the position are destroyed and Colonel Gaucher, the commander, killed. The Viet Minh infantry attack in the failing light after sappers have blown paths through the wire. Regardless of casualties the enemy move forward, overrunning bunkers and dug-outs. Hand-to-hand fighting with grenades occurs in the trenches and amongst the ruins. At 2100 only one strong point is still holding out. Shortly after midnight a heavy silence settles over *Beatrice*. The garrison of legionnaires has lost 75 per cent of its numbers and fewer than 200 men regain the main French lines.

'Promises, Promises!'

In the entrenched camp the French are dumbfounded. A strong point, defended by the Legion, overrun in six hours! Thousands of men look towards the lost position and try to understand. Col. de Castries, who has sat up all night by his telephones and has lived out the agony of *Beatrice*, alerts his HQ in Hanoi. He is promised reinforcements and air support. The airfield is all but closed and enemy shelling forces those fighter-bombers still intact to escape to Laos. In addition a quarter of the French 105mm ammunition has been exhausted in one night.

On the next day, 14 March, the 5th Vietnamese Parachute Battalion is dropped in reinforcement and de Castries contemplates a counter-attack on *Beatrice*. But low cloud and a violent storm make close air support impossible, besides which it is known that Giap's next objective will be *Gabrielle*. At 1800 the Viet Minh batteries begin their shelling of the strong-point, which is held by a battalion of Algerian riflemen and eight Foreign Legion 120mm mortars. The Viet Minh send in 88th and 165th Regiments of the 308th Division to the attack. It is eight battalions against one. Benefiting from their in-depth defense the Algerians resist the first onslaught. But by dawn on 15 March only one redoubt is still in French hands and awaiting a promised counter-attack by the main part of the garrison.

The counter-attack consists of two companies from the Legion and one battalion of Vietnamese paratroopers sup-



Well-equipped Viet Minh infantry dash round French casualties laid out in the ruins of their strongpoint. Commenting on the garrison in a 1964 interview, Major Bigeard said: 'If you had given me 10,000 SS troopers, we'd have held out.'



Viet Minh artillery well concealed in jungle where air strikes could not get at them. This gun is probably an old 75mm field howitzer, either French or Japanese. There were 48 such weapons at Dien Bien Phu, often firing from hillside caves.

Campus

Keystone

ported by six M24 tanks. It fights its way to within 1,000 yards of the position and enables 150 men to regain the French lines before the thrust is called off. The second outlying strong point has gone. Within two days of the start of Giap's offensive the French illusions have been shattered. Dien Bien Phu is a trap. Gen. Navarre is directing the battle from his office in Saigon, more than 1,000 miles from the fighting. Gen. Cogny, installed in Hanoi, has the immediate responsibility for the battle. Knowing of the setbacks of 13 and 14 March and realizing what they portend, another battle is to be fought in secret between these two officers.

Navarre finally arrives at Hanoi where a message signed by Cogny awaits him: 'One has to envisage the possibility of a defeat at Dien Bien Phu with the attendant loss of our personnel who are at present located there.' Cogny, having recognized inevitable defeat, wishes to make certain that responsibility for it does not fall on him. Henceforth, relations between the two generals conducting the same battle will be restricted to exchanges of written notes. But this does not stop them trying to find scapegoats—the engineer officers who designed the fortifications, the photographic interpreters, the transport and ground-attack crews, and—of course—the French civilian government.

The strength of conviction

At this point both Navarre's and Cogny's responsibilities are crushing and it is made worse by the fact that knowing the enemy's capabilities, they themselves chose the ground on which the battle is being fought. In 1953-54 the Vietnamese People's Army is a well-balanced force of divisions, regiments, battalions and companies, all well-equipped with up-to-date weapons and well-led and disciplined. In addition it is fighting for its own country and for a cause in which it passionately believed. To present this modern army as a collection of rebel bands was perhaps necessary for propaganda's sake but to believe it was absurd.

By 15 March morale in the Dien Bien Phu garrison is at its lowest ebb. During the night Col. Piroth, unable to face the defeat of his artillery, takes a hand-grenade and kills himself in his dug-out. In the command post, several officers have cracked. And de Castries hesitates, overwhelmed and overtaken by events. He lacks neither courage nor panache but rather the qualities needed to direct a battle of this magnitude. Later he will be taken to task for his passivity. But it must be remembered that he was ordered to defend Dien Bien Phu after several generals and colonels had 'declined the honor'.

A soldier of much sterner stuff is the hatchet-faced Langlais, commander of the airborne troops. On 24 March de Castries effectively hands over command of the entrenched camp to him with the exception of *Isabelle* which is put under the control of Colonel André Lalande. It is an unofficial transfer of authority and a tacit recognition of the plight of the garrison. Langlais is also aided by Bigeard, sent back to the valley some eight days earlier with his battalion. Bigeard is to be Langlais' adjutant. Ultimately the paratroop 'Mafia' will take over the defense of the base.

Taking advantage of several days rest from shelling, all those capable of wielding pick and shovel have been put to work reinforcing the dug-outs and bunkers. But on 16 March the 3rd Thai Battalion on *Anne Marie* sense that things are going against them. They decide to leave the field and return to their villages. And several hundred North African and Vietnamese desert and go to ground in the dug-outs on the banks of the Nam Yum.

Giap and the Front Military Committee have considered the lessons of the first phase of the offensive. Losses have been very heavy and it is decided to pursue the policy of strangling the base. In ten days his front line troops will dig more than seven miles of trenches and approach routes. A 50-yard tunnel will be dug to place an enormous explosive charge under the position known as *Eliane*. On the night of 30 March, after a violent preliminary artillery bombardment, the 312th and 316th Divisions launch their attack on the five hills that make up *Dominique* and *Eliane*. The battle rages for four days with hand-to-hand fighting for positions that are lost, recaptured and lost again. On one day, the defenders fire 13,000 rounds of 105mm ammunition. This is largely responsible for the enemy's terrible losses and their failure to take their objectives. But they have made some progress and continue to erode the defended area.

The situation becomes critical on 2 April after units from the 308th Division are thrown against *Huguette*. At this point Bigeard scrapes together forces for a counter-attack and Viet Minh units break off the action, leaving 800 dead on the wire. The morale of the besieged forces soars and is maintained when Bigeard and his paratroopers recapture one of *Eliane*'s lost strong-points. Into a harrowing battle, Giap throws four battalions but in vain. Overall, the French position has not improved. Several thousand men are still isolated and trapped. There is little they can do but delay defeat. The Viet Minh divisions have been exhausted by their efforts. Giap is forced to launch a campaign for the 'mobilization of morale and rectification of right-wing tendencies.'

But on 1 May he orders a general offensive to begin at 2200. On that day there remains for the garrison three days rations, 275 rounds of 155mm, 14,000 rounds of 105mm and 5,000 rounds of 120mm mortar ammunition. Two strong-points fall in the first assault, but Langlais and Bigeard hope to be able to hold on with reinforcements of men, supplies and ammunition parachuted into the base.

Overwhelming advantage

But the advantage of the attackers is overwhelming. Towards mid-day on 6 May Giap orders his Katyusha rocket launchers, the 'Stalin Organs', into action to blow up the dumps and spread terror in North African and Vietnamese ranks. By dawn on 7 May the base has been reduced to a rectangle of half a square mile. Incredibly Bigeard mounts another counter-attack with two companies supported by the last Chaffee tank. By 1800 all firing had ceased. The base does not surrender, it is simply overwhelmed.

The price paid in the 56-day defense of Dien Bien Phu is more than 2,000 French dead, 7,000 wounded and missing, and 7,000 prisoners en route for the death camps. And it has cost Giap 8,000 lives and 15,000 wounded to secure his 'revolutionary conquest'.

The French High Command was relying heavily upon the fire-power of its medium and fighter-bombers to destroy the supply lines of Giap's divisions and to smash those artillery batteries which had escaped the fire of the base's 155mm guns. It was mistaken reliance. In fact, the French Expeditionary Corps' air support is ridiculously weak, no more than a hundred strike aircraft, of which three-quarters are committed to the battle at Dien Bien Phu. More pitifully still, there are only 80 transport planes and too few pilots.

Dive-bombing attacks on the supply lines, just as those on the edges of the entrenched camp, have only a limited



E. C. P. Armées

The Vanquished—French officers attend a midnight Mass at Dien Bien Phu on Christmas Eve 1953. The aloof and highly aristocratic fortress commander, Col. de Castries, stands on the right of his CinC—Lt. Gen. Navarre holding the plain kepi.

effect because of the meticulous camouflage of the Viet Minh. Napalm, which had been used with devastating effect two years earlier at Vinh Yen, on the edge of the Red River defenses, is rendered less effective by the different thicknesses of vegetation in the dense forest. On the other hand, the Viet Minh anti-aircraft weapons (36 37mm cannon and 50 12.7mm machine-guns) are very formidable. It is soon obvious that French airpower cannot change the course of the battle.

In December 1953 Navarre had studied the operation which, coming from Laos, would crush the Viet Minh army brought to Dien Bien Phu. He had given this the name Condor. By April this was to be the last hope of relief for the defenders of Dien Bien Phu. Three-thousand men, two-thirds of them Laotian Light Infantry, would march on the base to attack the Viet Minh's rear areas. At the same time the guerillas of Colonel Trinquier's Mixed Airportable Commando Group would be mobilized, together with Mollat's commandos and all those groups of irregulars fighting in the Viet Minh areas. And an airborne task force would be sent as reinforcement in good time.

But on 22 April Navarre cancels the promised reinforcements and leaves the units already engaged freedom of action to continue or break off. These troops will get close to the perimeter and recover the 78 men to escape from the valley but on 7 May they will receive the order to pull back.

A breakout and withdrawal of the Dien Bien Phu garrison

towards Laos would have been, without any doubt, fraught with danger. But it was the only chance to escape annihilation. Capture of all the garrison, if it remained where it was, appeared inevitable. There was a possibility of trying to breakout on 3 May under the code name Albatross. The breakout, covered by all the guns and combat aircraft, would have been towards the south-east by those still capable of carrying four days rations and their personal weapons. In an effort to save some of the 6,000 men still able to fight, the wounded would have to be abandoned. But HQ in Hanoi vetoed the plan as being dishonorable. The forces inside the entrenched camp were left to their fate, to fight on heroically without hope until overwhelmed.

The debacle of Dien Bien Phu was due to a number of grave errors in the siting, supply and quality of the French defensive positions. Its ultimate destruction was due to the inability of the French to sustain an adequate supply of men, ammunition and provisions for the besieged garrison. To this must be added the brilliance of Gen. Giap's powers of leadership and the unexpectedly high quality of his AA battalions.

The loss of Dien Bien Phu was not only the end of a battle: it was the first time an Asian subject people had beaten its European masters in battle. And it was the finish of France as a colonial power in Indo-China.

Charles Meyer

LAMBERT'S BRIGADE

They crossed the Atlantic to help take Washington—and returned to fight Napoleon. At Waterloo they crushed the French infantry

Some hours before dawn on a cold and frosty morning in January 1815 some 6,000 British troops breakfasted off ship's biscuits and rum. Fog swirled about them from the mighty river which thundered on their left flank—the Mississippi. A bare seven miles to their front lay the Creole city of New Orleans. It was Sunday, and the bells of the cathedral were summoning the citizens to Mass. The soldiers checked their equipment and slipped forward into the mist, every one fiercely determined to do battle with the Americans and to wrest the proud city from their grasp.

For four weeks the army had been reaching out to take New Orleans. By capturing the city Britain would gain mastery over the trade of almost half America. With the entire Mississippi basin in her control and the infant Republic cut in two, she would be in a strong bargaining position for the peace talks at Ghent in Belgium. But neither side knew that peace had already been signed on Christmas Eve 1814. It was now 8 January 1815.

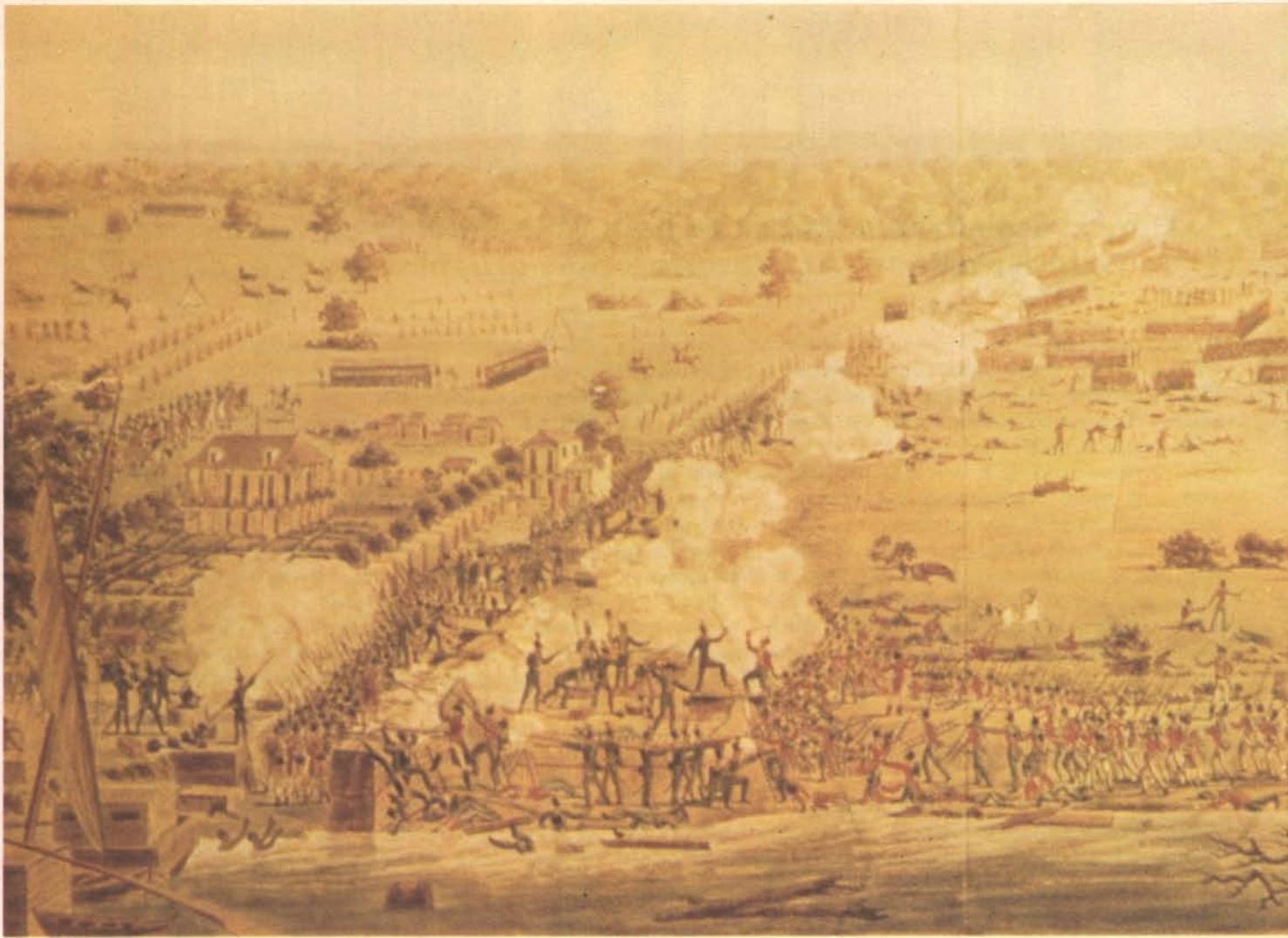
After Napoleon's defeat and abdication in April 1814, Britain had been free to send to America the cream of the Duke of Wellington's Peninsular Army which had driven

the Emperor's marshals across the Pyrenees and into France. Many, like the men of the 4th Regiment of Foot, or the King's Own Royal Regiment of Lancaster, under Lieutenant-Colonel Francis Brooke, had taken part in the victorious battle of Bladensburg (August 1814), the capture of Washington, the burning of the White House, and the descent on Baltimore. Wellington himself had been offered the command, turning it down, saying 'I shall do you but little good in America and shall go there only . . . to sign a peace which might as well be signed now'. Instead his brother-in-law and trusted subordinate, Major-General Sir Edward Pakenham, received the command.

Since the fleet was prevented by forts and sandbanks from sailing up the Mississippi the first wave of the British army had approached New Orleans from the east through Lake Borgne. More than 60 miles from their objective the warships and transports ran aground. A flotilla of 45 row-boats, manned by 1,200 sailors and marines set out and captured five American gunboats which barred further progress. The advance-guard of 1,600 troops under Major-General John Keane was then rowed ashore, the sailors

The grenadier company of the 4th Foot (seen here in Spain) are identified by white plumes. Picked men, they spearheaded a regimental charge at the Battle of Vittoria, taking the village of Gammara Mayor, 2,000 French prisoners and three guns.





The British fiasco before New Orleans—they lost more men in less time than at Bunker Hill (1775), where the 4th also stood and got shot at. Three light companies stormed an advanced 3-gun battery (foreground), but fell back unsupported.

ferrying the troops night and day for over a week, while the soldiers sat cramped and frozen in the boats. A bayou, or irrigation canal, was found leading to the firm land of the plantations nine miles south of the city.

By 23 December they were all ashore, the 4th Regiment at their head. A push towards the city at this point would certainly have sealed its fate, for it was lightly defended, although daily becoming stronger under the energetic guidance of Major-General Andrew Jackson, hero of the Creek Indian War. But Gen. Keane decided to await his expected reinforcements, and the army therefore camped on rich sugar plantations with the Mississippi on their left and a cypress swamp on their right. 'From the General, down to the youngest drum-boy, a confident anticipation of success seemed to pervade all ranks', wrote a young officer.

Late that evening exhausted men had lighted fires and settled down to supper when the shadow of a large schooner was seen slipping down the river. She was hailed and an officer screamed from her deck: 'Give them this for the honor of America!' as a terrible fire of grapeshot poured upon the unsuspecting redcoats. Then the American army fell on the camp. 'All order, all discipline were lost', as a desperate hand-to-hand battle raged for seven hours into the next morning. The 4th Regiment, initially the reserve,

was thrown in to secure the right flank in the course of the struggle.

The Americans eventually fell back, but the schooner *Carolina* continued firing while sharpshooters sniped and picked off sentries. 'This detestable system of warfare' was particularly obnoxious to the British Light Infantry, long accustomed to a *modus vivendi* with French pickets in Spain so that night outpost firing did not unduly disturb either side's sleep or inflict pointless casualties.

On Christmas Day Sir Edward Pakenham arrived with the second brigade, swelling the army to 4,700 troops. Accompanying him was Major Harry Smith, Assistant Adjutant-General, who was to play a notable part in the campaign. Pakenham was appalled to see the narrow front to which the army had been committed—only one mile wide. He soon saw the futility of a frontal attack, for Jackson had entrenched himself behind a dry canal with the river and swamp guarding his flanks, and had constructed heavy batteries. Pakenham built his own battery to destroy the two warships on the river. On 27 December 12 guns opened fire on the *Carolina* with red-hot shot. She caught fire and exploded, but the other vessel, the *Louisiana*, managed to escape. The following day two columns advanced to test the American defenses but were driven back with loss. 'The Americans are excellent marksmen, as well with artillery as



▷ A battalion company (white over red plume) officer of the 40th Foot, identified by a right shoulder epaulette.

▷ Sir John Lambert at the Waterloo anniversary banquet of 1836. Now a lieutenant-general he wears the badge and star of a Knight Grand Cross of the Order of the Bath with his Waterloo medal. Sir Colin Halkett (right) was supported by Lambert's Brigade at the battle. The bespectacled Alexander Dickson commanded the guns at New Orleans and returned in time to become Deputy-Quartermaster-General of the British field and horse artillery at Waterloo.

with rifles', a British veteran ruefully remarked.

For the next three days heavy naval guns and ammunition were rowed from the ships to the bayou, then dragged to the front. On New Year's Day 1815 all was ready to pound the American defenses. The troops prepared for another attack, although nobody had slept for two days, 'except such as were cool enough to sleep amidst showers of cannon-ball . . .' The army was eager to get at the enemy and 'grumbled like a chained dog when he sees his adversary and cannot reach him.' But they were to be frustrated once again, for the 30 guns in the hastily-built emplacements, made of sugar hogsheads, were soon silenced by the heavier American cannon.

Pakenham then boldly resolved to send a part of his force across the river to capture the American batteries there and to turn them on the enemy, while the main army made another attempt on the left bank. For almost a week the



National Army Museum/John Mitchell

The Queen's Lancashire Regiment



By kind permission of the Duke of Wellington/John Couzins



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◀ 'The 27th Regt. were lying literally dead in square, a few yards behind us.' Lt. John Kincaid of the 95th was not over exaggerating. At Waterloo, forced to stay in square by cavalry and to cover the Brussels road, this unit (only seven out of 10 companies present) lost more men than any regiment—478 lost out of 750, including 105 killed.

men dug a channel from the bayou to the Mississippi to enable barges to reach the river. On 6 January this was completed and on the same day Major-General John Lambert arrived with two more seasoned battalions, the 7th and the 43rd, each of 1,600 men carrying a cannonball in his already heavy knapsack. Major Smith was transferred to this brigade. The final battle was fixed for 8 January: that evening either the Stars and Stripes or Union Jack would be flying over New Orleans.

The redcoats were still confident that they would scatter the 'dirty shirts' once and for all as they advanced in the early hours of 8 January. The 21st Regiment led the right hand assault column with the 4th in support. Lambert's Brigade was held in reserve. Major Smith, showing uncanny foresight, told Lambert: 'In 25 minutes, General, you will command the Army'. At 500 yards the American artillery thundered, tearing great gaps in the British ranks. The guns fell silent, the smoke cleared, and the deadly hunting-rifles barked, every shot finding its mark. Generals Pakenham, Gibbs and Keane all fell.

By some oversight the fascines for filling the ditch and the ladders for scaling the ramparts were not brought up in time; some bold spirits managed to scramble up, only to be killed or captured. In half-an-hour the battle was over. The British lost 1,964 men—one third of the force committed. The Americans lost seven killed and six wounded.

Stubborn, futile heroism

However, Lieutenant-Colonel William Thornton stormed the American position across the river with fewer than 400 soldiers and sailors, driving 800 Kentucky militia back more than two miles. But this success, coming after the main battle, was in vain. Jackson, desperately anxious about this outflanking movement, was relieved to learn that Lambert, the new commander, sought a truce. Thornton's men were withdrawn and the dead buried in mass-graves. The 4th Regiment alone, without firing a shot, had lost 397 men out of 796; one man lost in every two, because a stubborn, futile heroism kept Wellington's veterans charging impregnable defenses. Lt. Col. Brooke was severely wounded and captured. 'Now gloom and discontent everywhere prevailed . . . hardly an individual survived who had not to mourn the loss of some particular and well-known companion' wrote an officer. Yet, amazingly, many still expected eventual success.

But Lambert decided to evacuate the remains of the army. Before they could withdraw in strength some kind of road had to be built through the swamp to the edge of Lake Borgne 10 miles away. By 18 January it was finished, and for three days the men struggled to the waiting boats. Then

◀ The center of Wellington's army at La Haye Sainte: 'Sir John Lambert continued to stand as our support at the head of three good old regiments, one dead and two living.' French Cuirassiers and lancers swirl round the redcoat squares which are supported by Life Guards. In the left middle-distance Napoleon with his staff can be seen urging on the Imperial Guard and pointing the way to Brussels.

came the agonizing row to the ships where they met reinforcements, the 27th and 40th Regiments. Recently from Canada and the autumn campaign on Lake Champlain, they came too late to be of use.

On 4 February the fleet sailed for an attempt on Mobile, east of New Orleans. Mobile Bay was guarded by Fort Bowyer which had already successfully resisted naval bombardment and a British-led Indian attack. On 7 February the 4th, 21st, and 40th Regiments landed in front of the fort defended by Major Lawrence with four companies of regulars from the 2nd US Infantry Regiment. By the 11th 16 guns were ready to bombard its frail mud walls; Lawrence surrendered his 360 men and the light company of the 4th took possession of the gate. On 14th February news came at last of the Peace of Ghent.

War with fir-apples

While waiting for ratification of the treaty the army camped on the Isle Dauphine in Mobile Bay near Fort Bowyer. Despite all they had suffered the men had not lost their sense of humor. 'Weared by a state of idleness, the officers of the 7th, 43rd, and 14th dragoons made an attack with fir-apples upon those of the 85th, 93rd, and 95th. For the space of some days they pelted each other from morning till night, laying ambuscades, and exhibiting, on a small scale, all the strategems of war; whilst the whole army, not even excepting the Generals themselves, stood by and spurred them on', wrote one participant in these wargames.

On 15 March, the treaty ratified and prisoners exchanged, the army set sail for England, touching at Havana and Bermuda and then sailing directly home. After a gale off Cuba the crowded, clumsy transports finally caught fair winds, making the final Atlantic crossing in two weeks. On 9 May the French port of Brest was sighted and they were astonished to see the tricolor fluttering above the citadel.

In the Channel a merchantman was hailed: 'Any news?' 'No.' The ship was almost past them when they heard: 'Bonaparte's back again on the throne of France'. Harry Smith tossed his hat in the air, prompting Lambert to say: 'How is it possible? It cannot be'. But the intense activity at Spithead was ample evidence that it was true. Smith then received a letter from Sir John Lambert, who had just been knighted for his services at New Orleans, summoning him to Belgium with the post of Brigade-Major.

Unfit for campaigning

The 4th Regiment disembarked at Deal on 8 May. Re-equipped and reinforced by drafts of recruits, it sailed for Ostend, 669 strong, on 10 June and from there marched to Ghent. It joined the two units which had arrived too late for New Orleans, the 1st Battalion of the 27th (Royal Inniskilling Fusiliers) and the 40th (South Lancashire Regiment), to form the 10th Infantry Brigade under Lambert; the other New Orleans battalions, short of officers and under-strength, were still unfit for campaigning. At Ghent the brigade provided the guard for the newly-exiled Louis XVIII of France.

Lambert, ex-Adjutant of the Grenadier Guards, held daily brigade parades. 'The three regiments were in beautiful fighting trim', wrote the Brigade-Major, although the Grenadier company of the 27th had not yet arrived from America. All ranks relished the prospect of fighting the French again—'civilized' warfare instead of a bitter struggle with an English-speaking nation.



The Queen's Lancashire Regiment

Major Arthur R. Heyland killed commanding the 40th Regt. at Waterloo during the final French attack. Twelve of his brother officers were also hit. One roundshot decapitated Capt. Fisher and laid low 25 of his men. After four hours pounding, the 40th still took part in the General Advance: the grenadier company helped recapture La Haye Sainte.

On 17 June Louis XVIII had his usual mutton-chop breakfast and the brigade received its orders. Napoleon was advancing on Brussels. At noon the citizens of that city were heartened to hear the tramp of feet as they marched through, the Irishmen of the 27th in the van, drums beating and colors flying. They reached the village of Waterloo on the morning of 18 June with bands playing, having force-marched 48 miles in 30 hours, and Wellington turned out to receive their salute from a balcony. At Mont St. Jean they were held in reserve behind the army's center.

Lambert was appointed to command the 6th Division of which the brigade formed a part: Lt.-Col. Brooke of the 4th therefore headed the brigade and one of his two remaining captains commanded the regiment. Harry Smith was the only British staff officer in the division and received the orders from Wellington himself, who had been informed that the 4th, 27th and 40th had returned, while the 81st remained in Brussels. 'I know; but the others, are they in good order?' asked Wellington, 'I shall want every man'.

Smith had scarcely returned to the brigade when the battle of Waterloo commenced. At about noon they went to



National Army Museum

Major Harry Smith, an exuberant 27-year-old Rifleman who served as Pakenham's Asst. Adjutant-General and then as Lambert's Brigade-Major in 1815. He had already been the bearer of dispatches to England, announcing the capture of Washington. During 46 years of active soldiering, ending with the Sikh and Kaffir wars, Smith was never wounded.

support Picton's Division to the left of the Brussels road. During the afternoon they took up position behind the Wavre road where it crossed the road from Brussels. Formations and positions were changing with bewildering frequency throughout the battle but generally speaking the brigade was deployed as follows: The 40th under Major Heyland was on the left with the remains of Kempt's brigade behind the hedge lining the Wavre road. The Hanoverian Brigade was to their rear. The 4th was in the center extended along the forward edge of the Wavre road with the 1st Battalion of the green-jacketed 95th Rifles. The 27th, under Colonel Hare, was in square on the right with its right flank resting on the Brussels road.

An intense cannonade was flailing the entire Allied line. Under cover of this fire, Marshal Ney led repeated charges against the farmhouse of La Haye Sainte which formed a bastion to the line. Skirmishers of Donzelot's division were beaten back by Kempt and Lambert. Over 5,000 French cavalry charged the right center continuously for an hour and a half only to be thrown back by artillery and musket fire.

As the Prussians under Marshal Blücher approached, the



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The Queen's Lancashire Regiment



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1 An officer's belt plate of the 27th Foot. It bears the castle of Enniskillen and a bugle for the light company.

2 Brass shoulder belt plate for the 40th Regt; the same item may be seen worn in the square of the 27th (page 34).

3 A shako hat plate of the 4th Foot; a Royal Regiment, the plate has the King's cypher beneath the lion of England.

French attacks grew more ferocious. Cavalry and infantry charged together with close artillery support. The brave King's German Legion defending La Haye Sainte ran out of ammunition and were driven out. From the farm itself and from a double line of skirmishers on a ridge in front of it a galling fire poured on the British. The 27th, forced to remain in square by the cavalry threat, suffered terribly. Lambert's men stood like a rock nerving the inexperienced Brunswick and Belgian troops to stand with them and hold Wellington's center.

Shortly before sunset Napoleon launched the Imperial Guard in a last desperate onslaught to break the Allied line before the Prussians swayed the balance. They came steadily forward, staggered under volley after rolling volley of musketry, and fell back in disorder. At the same time Alix's division of D'Erlon's Corps made a third attack on the left center but never even reached the line. Lambert's brigade fired fast and furiously at the advancing columns, the men helping themselves to ammunition from boxes placed at intervals behind them. One by one the French columns broke until the firing ceased altogether.

Wellington ordered the General Advance. Lambert's men cheered as he rode up to order them to move but Major Smith, unable to see anything through the smoke, asked

him in what direction. 'Right ahead, to be sure', the Duke replied. As he raised his cocked hat the entire line advanced, the smoke cleared, and the setting sun briefly lit the scene.

Lambert's brigade charged across the road and retook La Haye Sainte at bayonet point, only stopping at La Belle Alliance where they camped for the night. The 4th had lost 134 officers and men; the 40th, 193 out of 761 rank and file; but the 27th had heavier losses than any other British regiment in the battle—478 casualties out of 750. Every officer was killed or wounded. Gen. Lambert and Lt.-Col. Brooke again sustained wounds. The brigade, 2,200 strong in the morning, had lost one man out of every three.

By 7 July they were in Paris, destined for the more restful duties of an army of occupation. In the short space of a year the 4th Foot had twice crossed the Atlantic, entered two capital cities, and fought in five battles, each more severe than the last. The American war had deprived Wellington at Waterloo of 15,000 of his best veteran infantry; only Lambert's three battalions had returned in the nick of time to reinforce the weaker half of the old Peninsular Army. At New Orleans and Waterloo the men of the 4th had died where they stood with the same unflinching devotion, only the results differed.

Richard Hunter

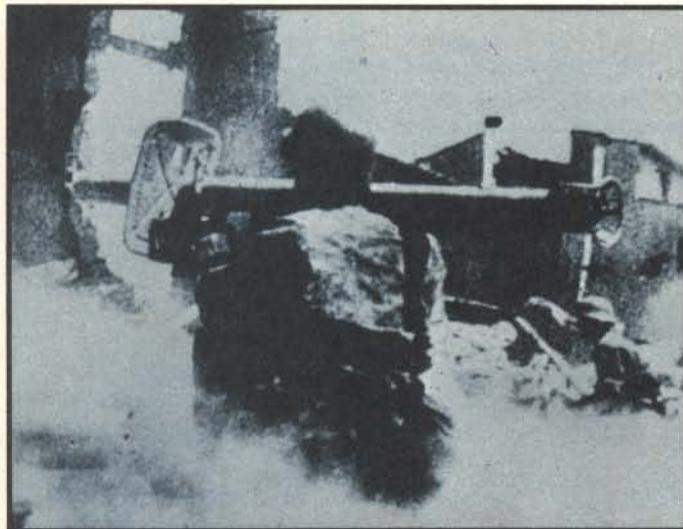
TANK v MISSILE

Tanks have spear-headed armies since 1916. Weapons to combat them are becoming more complex. Can the missile make the tank obsolete?



Of the 32 tanks that trundled into battle against the Germans on the Somme in 1916, nine broke down, five floundered in battlefield craters and another nine could not keep up with the infantry. It was an inauspicious debut—and ever since, despite numerous subsequent successes, observers have sounded the tank's death knell, claiming the missile as its executioner. In spite of this, the tank has survived repeatedly to dictate the terms of battlefield arbitration.

In 1916, field-guns, firing high-explosive shells, were expected to obliterate the tank. The British, pioneers of the tank, agreed that they were the principal menace, and after the first tank trial on 15 September 1916 the Germans



△ The Bazooka, introduced in 1943 by the US Army, was soon copied by the Germans, who had Panzerschreck and Panzerfaust (shown here) in action. A similar weapon was the British-developed Piat. These AT weapons fired hollow-charge, high-explosive projectiles to good effect.

◁ A tank, probably a Russian T34, ablaze. However much its bulk, its appearance of an unstoppable, death-dealing force, the tank is an effective battle-weapon only when employed in a panzer-type action. Against well-trained and determined troops, at close quarters, it can be a death-trap.

were convinced this was the case. They were wrong. But they did not awake to the blunder until they had suffered crushing defeats by tanks in 1917 and 1918. It was true that artillery could knock out the thinly armored tanks of 1916-18 but ordinary field-guns, with a relatively low muzzle-velocity and a large zone of dispersion, could not guarantee sufficient hits in time to avert the counter-measures which the tanks, supporting artillery and escorting infantry, could mount.

Under the extreme conditions of heavy bombardment, a World War I tank, finding itself in the center of a concentration of shells, would usually escape a direct hit. The tank's thin armor plating deflected shell splinters and its mobility and firepower gave added protection. Once under attack, the tank commander's first order was for the driver to take cover—the next, to the gunners, was to retaliate.

At the Battle of Amiens in August 1918 the tanks concentrated on eliminating the enemy machine-guns, which were the arch enemy of infantry. The infantry silenced the artillery, the arch enemy of tanks. Tactics were varied to suit the threat and armored vehicles won tactical and strategic victories at infinitely lower cost in lives than exposed infantry would have suffered.

In the 1920s, however, tank development fell behind that of small, light-weight high-velocity (and therefore very accurate) anti-tank guns. The appearance of a variety of types, firing solid-shot projectiles weighing between two or three pounds at velocities of 2,800ft per second, convinced many that high-velocity guns spelt the tank's demise. Moreover, experience gained in the Spanish Civil War of 1936-39 tended to encourage the prophets of doom, for Russian-built tanks on the Republican side, driving far ahead of infantry and artillery support, were repeatedly rebuffed, and those driven by the Italians and Germans in the Nationalist cause did no better. But here the tanks had been tactically misused and sometimes ineptly commanded into the bargain. They were used without support vehicles and ran up against solid defenses in unfavorable terrain—under such conditions tanks were bound to suffer punitive losses.

Tank theory and practice

The correct way to deploy tanks tactically—against enemy weak spots and fully co-ordinated with infantry, artillery and air power—was demonstrated by the Germans in Poland in 1939 and right through to 1943. Under these conditions an offensive tank force would invariably prevail over static enemy defenses and a diluted and unsupported tank force. The Germans also used anti-tank missiles to devastating effect. Their technique was to move tanks into vital ground and provoke or compel the enemy to launch a head-on counter-attack. In defense, the high-velocity gun and low-velocity artillery of the Germans wreaked havoc among the enemy tanks. The fault was the head-on assault which spelt disaster—tanks maneuvering to envelop the enemy generally held the advantage over static defenses. Coupled with this was the fact that as tanks became more heavily armored, anti-tank guns had to be increased in size to counter this. They thus became more and more unwieldy.

Paradoxically it was Hitler, whose greatest victories had been won by the tank, who most readily seized every chance after 1942 to propagate anti-tank weapons at the expense of tank production. By then Germany was on the defensive—and Hitler had never grasped the tank's advantages as a defensive-offensive weapon system. The search was on for a light, universal anti-tank weapon. So when Hitler's artillerymen offered him a hollow-charge warhead, with power to penetrate any thickness of armor, he seized upon a cheap weapon which might, at a stroke, out-mode the tank and its threat to his conquests. Hitler gave a similar reception to the light-weight infantry bazooka-type weapon, firing a hollow-charge warhead from short range. Yet again the disadvantages of a panacea weapon had been understated.

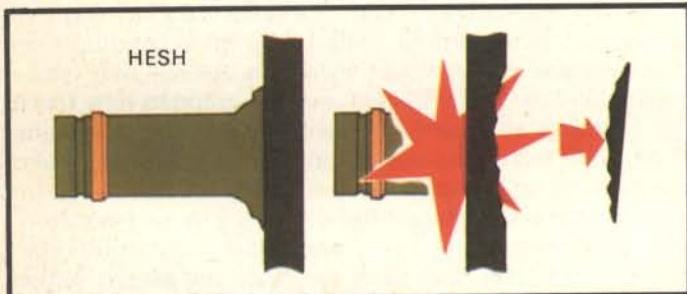
The difficulty of scoring a hit with low-velocity guns was as great as ever—and hollow-charge warheads fired at high velocities fall off sharply in performance. And so far as the early infantry bazookas were concerned it took a brave man to expose himself at their limited range (with a relatively unreliable weapon) to a thickly-armored tank advancing with guns blazing and supported by infantry. At close range in an ambush he might do better, however, and in the final stages of the war in Europe (admittedly at a period when the German tank force with its high-velocity guns was fading away and the bazooka (*panzerfaust*) weapon was in prolific supply) out of about 330 British tank casualties some 40 per cent were caused by guns and 33 per cent by the bazooka.

The threat of the bazooka loomed large in the minds of many tank commanders in 1945. Previously there had always been a chance that enemy tanks or guns might accidentally disclose their presence before firing and that once they had opened fire their position would be pinpointed by flash and smoke, thus exposing them to effective counter-action. The bazooka man was much more difficult to detect. Even when his position was revealed at the moment of action he stood a chance of escaping into a nearby trench.

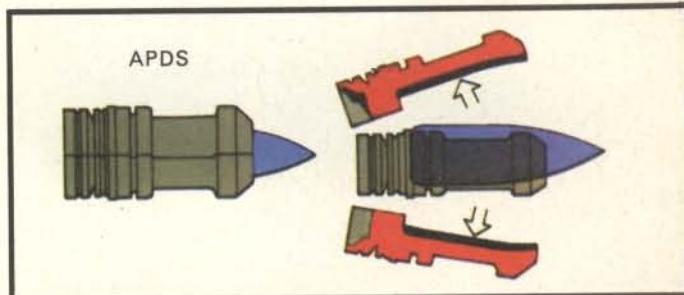
Tank and infantry teams had to be much more closely combined to avoid ambush, and when bazooka ambushes allied to skilfully laid minefields became commonplace the tempo of tank advances slowed down, particularly in enclosed country. Tanks tended to wait for infantry—and they were understandably reluctant to precede tanks and risk being cut down by machine-guns. The need for armored protection was as great as ever but the missile was becoming difficult to combat. Stalemate threatened.

In such a situation there were renewed prophecies of the tank's demise as an effective war weapon. Shortly after these, however, a few hundred North Korean tanks rolled over the border and almost managed to subdue South Korea and the forces of the United Nations by employing the same kind of thrust used in the conquests of World War II. Put quite simply, the North Korean tank force hit a weakened enemy and employed classical tactics of mobility to exploit weakness. Short-range US Army bazookas inflicted a few casualties but could not halt the advance. Air attacks on the North Korean lines of communication and tank-versus-tank actions inflicted most damage on the North Korean armor.

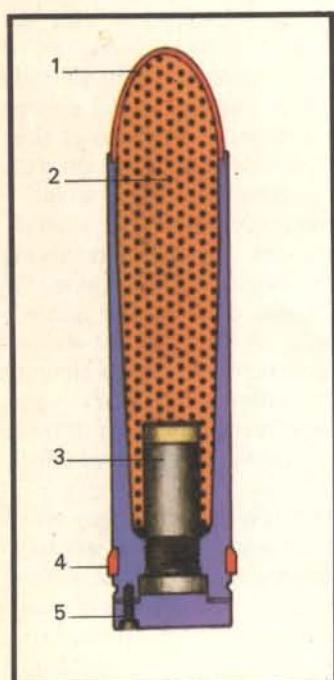
Before and throughout World War II the Germans, more than any other nation, carried out research and development into guided rocket-propelled missiles. This effort was directed in the main towards air warfare but a spin-off was a small missile, the X7, which was guided towards its target by signals, sent from the operator down a thin cable paid



High Explosive Squash Head. Does not penetrate, but a 'scab' of armor plate is detached from inside at 600 mph.

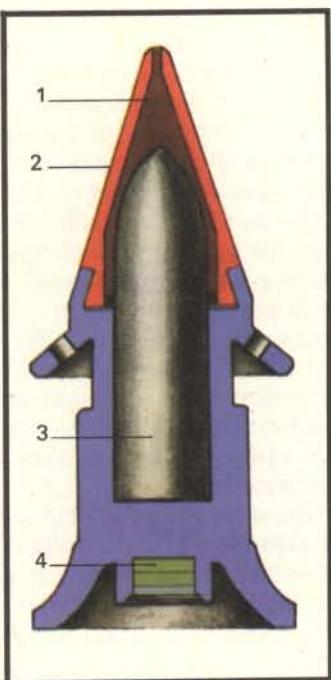


Armor-Piercing Discarding Sabot. A high-velocity shell. The discarded tungsten projectile has great penetration.



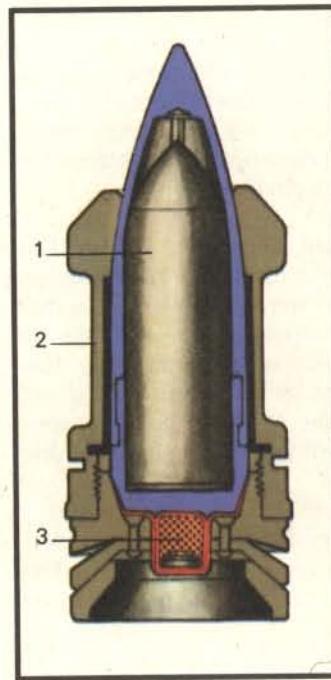
HESH

- 1 Outer nose casing of aluminium or copper
- 2 RDX plastic explosive
- 3 Base fuse
- 4 Driving band
- 5 Fixing screws



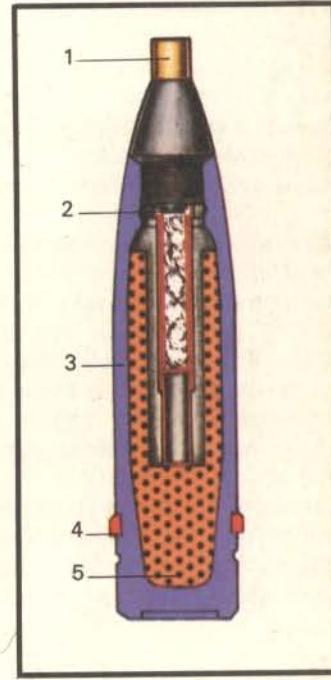
German APCR

- 1 Phenolic plastic filling
- 2 Aluminium alloy ballistic cap
- 3 Tungsten carbide core
- 4 Tracer composition



APDS

- 1 Armor-piercing core of tungsten carbide
- 2 Plastic or light magnesium alloy sleeve or sabot
- 3 High-explosive charge



High Explosive

- 1 Nose cap
- 2 Fuse assembly
- 3 Outer casing
- 4 Driving band
- 5 High explosive filling

out behind the missile in flight. The Germans never went far with this project but the French took it up after 1945 and produced the first operational Anti-Tank Guided Weapon (ATGW), the SS10, with a shaped (hollow) charge warhead and a range of 1,750 yards. Existing anti-tank guns, however, were already effective at ranges in excess of 2,200 yards and they were far cheaper to produce—so enthusiasm for this weapon was low even among the keenest anti-tank proponents.

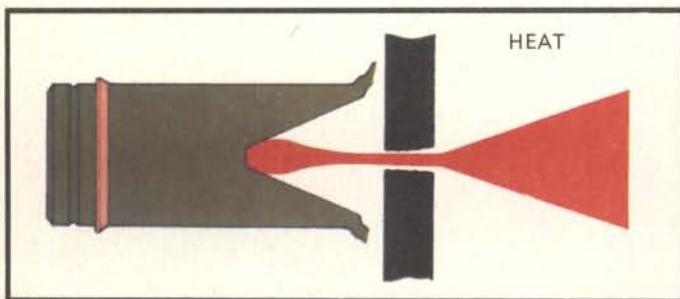
A well-trained tank gunner, supported by efficient loading of the tank's armament, could loose off 10 well-aimed shots in a minute. All he had to do was sight the target, assess the range (the crucial and most difficult skill), lay an accurate bead and press the trigger. After that he waited to observe the fall of shot a second or two later before adjusting his aim (if he had missed) and continuing the engagement.

The ATGW operator, on the other hand, has a more complicated procedure to go through, one that requires the considerable skill and training only a long-service soldier



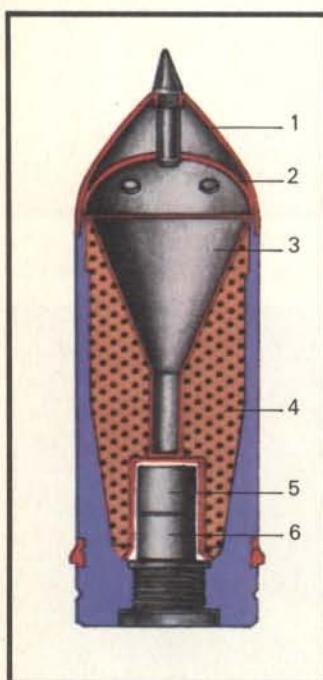
Camera Press

An Israeli-manned British -designed Centurion tank, armed with a 105mm gun firing tungsten-head AP ammunition.



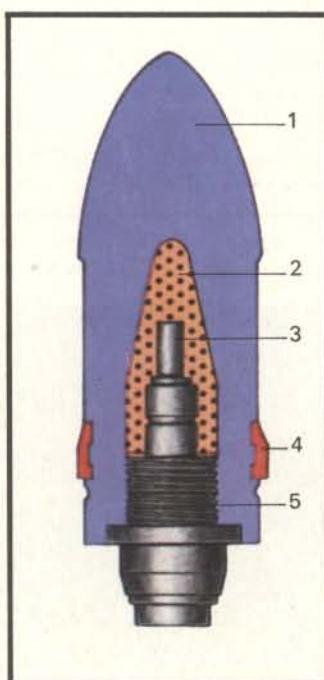
Sanson/Bryan

High Explosive Anti Tank. On impact a lethal jet of molten metal and gas is directed through the armor at 27,000ft/sec.



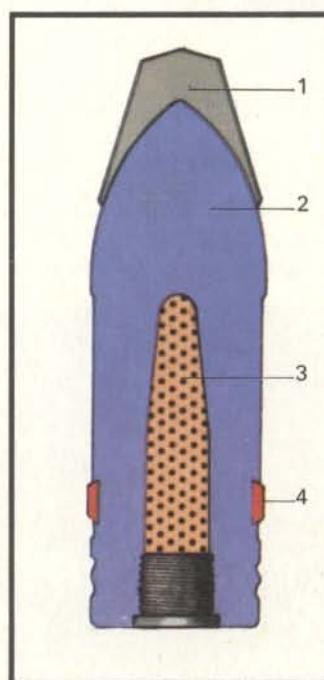
HEAT

- 1 Nose cap
- 2 Diaphragm
- 3 Steel liner
- 4 PEN/D1 charge
- 5 Exploder charge
- 6 Tracer



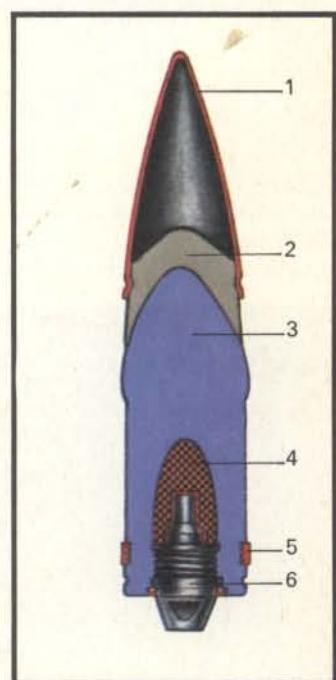
Armor Piercing

- 1 Solid shot
- 2 High explosive charge
- 3 Detonator
- 4 Driving band
- 5 Fuse assembly



Armor-Piercing Capped (Improving AP shell)

- 1 Nose cap
- 2 Casing
- 3 High explosive charge
- 4 Driving band



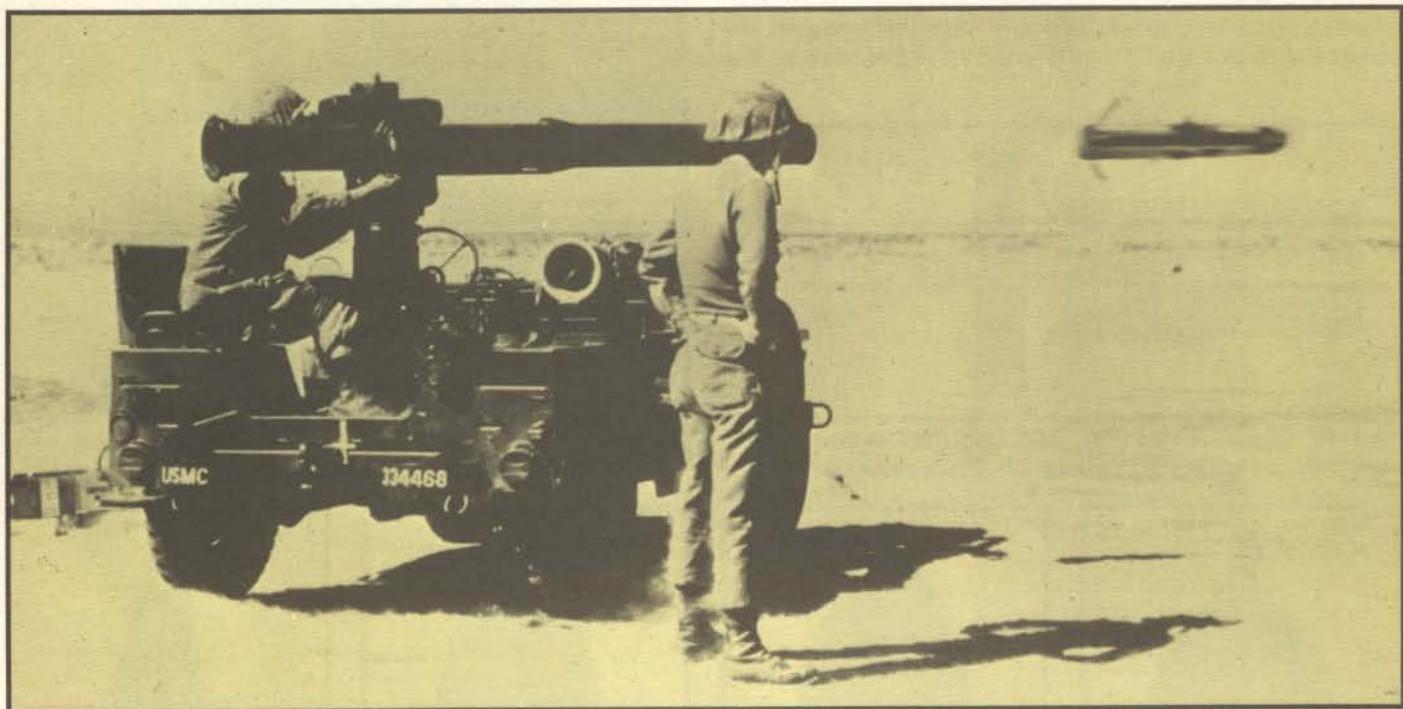
APC + Ballistic Cap

- 1 Windshield
- 2 Cap
- 3 Body
- 4 High explosive charge
- 5 Driving band
- 6 Base fuse and tracer

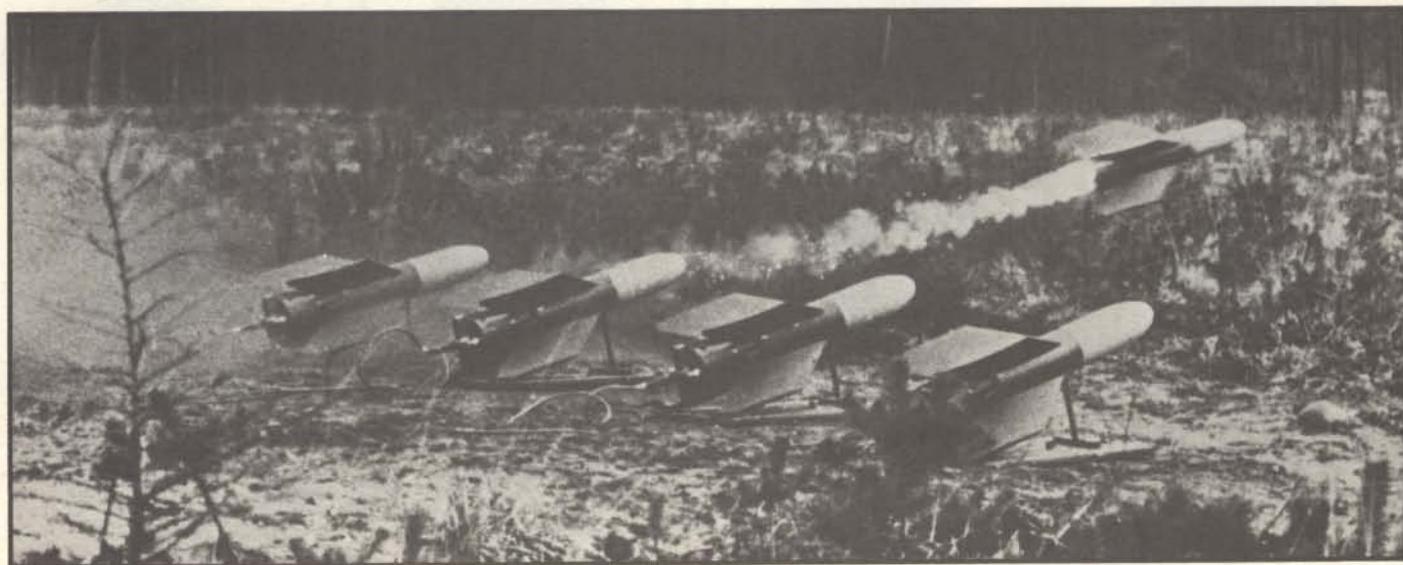
Sanson/Bryan



A Cheyenne, an American army helicopter, launching TOW. This heavy US-made AT missile, full title 'Tube-launched, optically tracked, wire-guided missile' has a range of at least 3,000 yards. Six of these can be carried in the Cheyenne.



TOW again. This time just launched from a US Army vehicle during tests in the California desert. The missile receives its guidance control through two fine wires. It was used by the Israelis during their 1973 War against the Egyptians and Syrians.



A battery of SS-10 anti-tank rockets. This weapon, another guided AT system, of French manufacture, is being issued to AT units of the Bundeswehr. The 8.8lb charge of SS-10 can penetrate 25in of armor at a range of over 2,000 yards.

is likely to have. The first stage, particularly with the original missiles was a series of lengthy tests to make sure that the missile's electronics and gyroscope were serviceable—and the early missiles were quite sensitive to adverse environmental factors, particularly damp.

Missiles mounted in vehicles had fewer problems than those on ground mountings which were more complex to set up, though they offered the least obvious target to an enemy. Then, when the enemy is in range, there is a nervy, period in which the operator prays for the missile to function properly. When it does (they are much more reliable now) there is a period of time before the missile is fully under the operator's control.

Some missiles cover 400 yards before coming under control and therefore short-range engagements are precluded. The first, manually controlled missiles, were flown by joy-stick control to the target, the operator maintaining its course by tracking the missile's flare down the line of sight. Missiles fly at sub-sonic speeds and in a long-range engagement can take as long as 20 seconds to reach the target. The rate of fire is, therefore, much reduced compared with the gun and the operator is under prolonged tension from fear of enemy counter-measures. There is also the possibility that the target will move out of sight or that smoke and dust will obscure it before the missile reaches its destination. All these factors reduce the chance of a hit.

Limitations of the missile

Missiles and their ancillary equipment are expensive. A comparative costing in the mid-1960s makes a round of anti-tank ammunition more than 20 times cheaper than a missile. The missile, moreover, can only engage one type of target, the tank, effectively whereas the tank's gun can fire any type of ammunition—solid shot, shaped charged, high explosive and smoke. Furthermore a tank gun, stabilized in traverse and azimuth, can fire quite accurately when the vehicle is on the move—something the missile cannot do. The gun is simpler to operate than the missile so training costs are less.

Throughout the 1950s and well into the 1960s the ATGW remained untested in battle. Rumors that the Israelis had used some French missiles during the campaign of 1956 were unfounded. These battles against the Egyptians were won by the conventional use of armored and infantry forces equipped with the anti-tank gun—the equipment employed by both sides was mostly of World War II vintage. The ATGW may have been used in the Indo-Pakistan war of 1965 but it is unlikely. This was a confrontation of tank versus tank, locked in head-on engagements where the gun was repeatedly the decisive factor. Of course, the major powers were constantly experimenting with the ATGW and gradually the advantages and limitations of the weapon were evaluated.

Conclusions can be drawn from these investigations. In a defensive position, with sufficient time to make preparations, the missile posed a substantial threat. Carefully concealed and dug in, it could be launched from out of sight behind a crest and might deal effectively with enemy tanks lurking at a distance. It could be fired at night if used in conjunction with flares. New missiles with longer ranges of 4,380 yards offered useful complement to the gun giving a way of striking the enemy well beyond effective gun range. The trouble was that getting a clear line of sight over such a distance is only occasionally possible. In European country most tank engagements take place under 1,640 yards

(sometimes much less), although in the desert the longer ranges of engagement are far more frequent.

In the attack, the missile seems less attractive. Because of its lack of ability to fire on the move it cannot react swiftly and is best used in a limited supporting role. Missile-launching vehicles thrust into the forefront of the attack usually run into trouble.

The missile has one great advantage over the gun—it does not recoil. The gun with its buffer systems has to be mounted in a roomy turret or on a clumsy field carriage. The missile can be launched from a rack on the lightest and smallest vehicle. When fitted with stabilized telescopic sights, the missile can also be launched from a helicopter, giving the crucial advantages of height and mobility. At one stage it was felt that tank crews would not spot the helicopter and that battles between helicopters and tanks would ensure without other weapon systems being involved.

In Vietnam, from 1961 onwards, many American helicopters were in service—and many were lost in the forward areas to Viet Cong and North Vietnamese small arms fire and later to light anti-aircraft weapons. The Viet Cong and North Vietnamese rarely used tanks but even their primitive defense systems posed considerable problems for the lightly armored and noisy helicopters, which were particularly vulnerable when they hovered or had to land near the front line. It is unlikely, therefore, that helicopter-borne ATGW would pose much of a threat to more advanced defense systems.

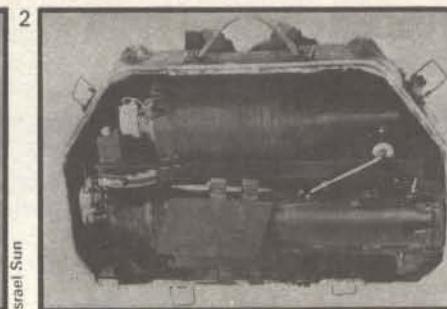
In 1972 an extended action took place in Vietnam where tanks were ranged against missiles. The Americans, in response to peace pressure at home and their continued inability, despite massive firepower, to subdue the insurgents were withdrawing their forces leaving the South Vietnamese Army (ARVN) to battle with the Viet Cong. US airpower, however, was still available to the forces of the South.

Excellent artillery fire

In April 1972 three North Vietnamese Army (NVA) divisions advanced from Cambodia along good tracks into South Vietnam's Binh Long Province and headed for An Loc. They were supported by excellent artillery fire which included the latest 130mm Russian gun, far outclassing its rivals in range and delivery. Additional support from anti-aircraft guns (but not missiles) made life hazardous for all types of attacking aircraft, including helicopters. The corps marched forward. And in the middle of the corps, something unique in NVA deployment—a complete, well-maintained armored task force of over 100 vehicles including Russian T54 tanks with 100mm guns, armored infantry, anti-aircraft vehicles and light amphibious PT76 tanks. Yet, with one exception, there was hardly anything unique about the battle which developed in and about An Loc on 13 April.

Basically the ARVN defense, forewarned of the tank threat, rested upon an infantry force backed by 105mm field howitzers and an infantry anti-tank force of 24 three-man tank hunting parties, armed with M72 LAW—a 66mm hollow-charge weapon with a range of 270 yards and the ability to penetrate 260mm of armor. US air attacks were withheld for fear of hitting the ARVN who fought in the midst of the NVA forces. A small experimental unit of US helicopters armed with 2.75in free-flight rockets fitted with the M72 warhead were available as well as some automatically guided TOW missiles.

An Loc lies in the shadow of low hills and for weeks prior to the 13 April had been the target of intensive artillery fire.



Israel Sun

Ministry of Defence

SAGGER

'...the objects... looked like suitcases. Then we knew... that they were missiles'. So reported an Israeli tank commander in the 1973 War describing Sagger, a Russian anti-tank weapon, shown here in its stages of preparation for firing. Range is over 2,000 yards.

- 1 The 'suitcase', with straps for carriage.
- 2 The case opened to show warhead and motor.
- 3 The fins being adjusted by an Eastern bloc infantryman.
- 4 Sagger ready to fire, with fins stabilized for roll correction.

The assault came forward at about 10mph with 12 tanks in two rows carrying infantry on their decks. Pre-planned concentrations from the 105mm howitzers and mortars rapidly parted the infantry from the tanks. But the latter kept advancing into the town seemingly oblivious to danger and hardly deigning to traverse their turrets and fire their weapons. (They may have thought the town had been evacuated.)

The first ARVN M72s fired from upper storey windows and missed, but eventually the lead tank, from a range of 22 yards was knocked out. The NVA attack faded away. Intervention by the rocket-armed helicopters also seems to have taken place and, as usual when aircraft meet tanks in battle, extravagant claims for kills were submitted. There is good evidence in this case that the infantry scored rather better than the helicopters.

Scattered tank attacks took place throughout the following month. Aircraft and helicopters sometimes caught the tanks before they had moved far—helicopters scored at least one kill against a light PT76 with the 2.75in rockets and claimed several more with TOW. Other tanks crashed into bomb craters and were subsequently destroyed. Invariably the NVA crews showed little comprehension of their tank's capability; they advanced with guns silent and frequently 'abandoned tank' when in difficulty.

But to hit a tank with the M72, ARVN infantry had to open fire at ludicrously short range—rarely more than 33 yards—something which would have been impossible if the enemy

tanks had sprayed the roadside with fire or had been closely escorted by infantry. As it was the NVA tanks fell victim to their own inferior tactics—exactly like their tank forebears in Spain in 1936.

On 12 May a renewed attack upon An Loc was blocked at the outskirts when M72s at 30 yards knocked out the lead tank on a bridge. Again the M72 operators might not have been so coolly efficient if the NVA artillery concentration had not been lifted before their tanks reached a vital bridge near the town. Three days later a Sergeant Cao Tan Tai destroyed two tanks with four M72 shots—the first at a range of 10 yards which set light to the tank's ammunition. Neither tank fired a shot in its own protection.

No fewer than 36 destroyed NVA armored vehicles eventually cluttered the streets of An Loc and many more littered the surrounding countryside, the victims of conventional aircraft, helicopters firing TOW and artillery. The tank had been routed by the missile—or so it appeared. In fact those who commanded the tanks were entirely to blame for employing poor tactics with untrained crews and, as a result, suffering a quite unnecessary defeat. And at short range, applicable to the An Loc action, ATGW could hardly have been used effectively. The victory was with the infantry's M72s as it had been for bazookas in 1945.

During the Six Day War in Sinai, Jordan and Syria in June 1967, the armored clashes on all three fronts were dominated by the gun. Israeli tanks of British, American and French type armed with 105 and 90mm guns advanced in

5 Before firing Sagger, the target is checked by periscope. The 'joystick' control will ensure accuracy and keep Sagger on course.

6 Sagger can be fired from a modified BRDM, or BRDM-2. These armored reconnaissance vehicles, also used by non-Soviet Warsaw Pact countries, are ideal for carrying this weapon. The missile has also been exported from Russia.

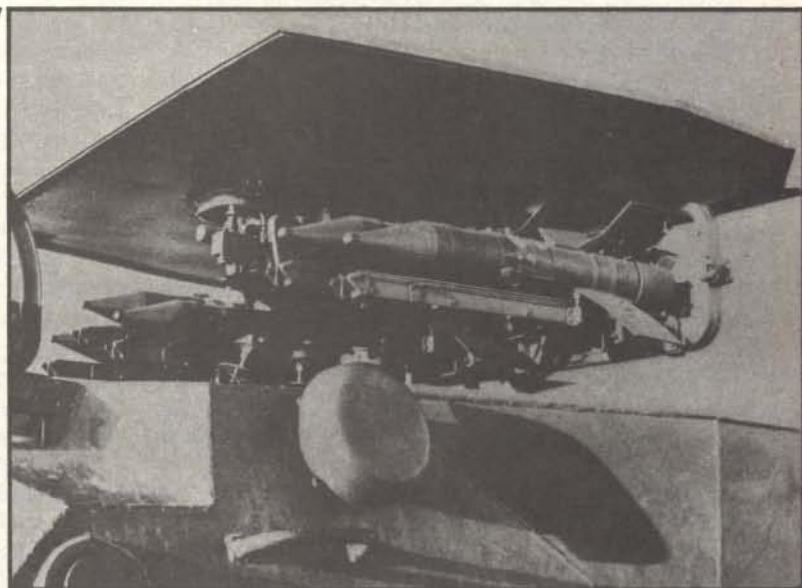
7 Sagger on its mounts on a BRDM. The roof and launch rails are elevated before firing.



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the manner of desert tank forces of World War II towards the Arab forces whose tanks were almost entirely Russian, armed with 122 and 100mm guns, and whose defensive tactics followed the Russian concept. In a surprise, pre-emptive strike the Israelis caught their opponents off-guard and swept them into disarray and ultimate collapse.

There was little originality about the methods of either side. Gunnery was orthodox since both sides relied on the basic techniques of judging distance by firing a two- or three-round engagement in order to establish exact range prior to scoring a hit. The Israelis held several distinct advantages: their methods were simpler, their crews better trained, and their 105mm guns were more accurate than the Russian 100mm guns.

Range of effective Israeli anti-tank engagement rarely averaged 1,300 yards—for the fundamental reason that they ruled out attempting to teach their militia crews the specialized techniques which made long-range shooting worthwhile. Simplicity was the watchword. Guns were exactly aligned to sighting mechanisms in peacetime by the cadre of highly trained regular soldiers; the gunners were restricted to firing only at shorter ranges where the high velocity shot's flat trajectory coincided with the sight line. Providing the correct drill was applied and the cross-wires laid dead on target a first-time hit was almost assured.

Having breached the enemy lines by surprise and wiped out the static defenses by combined tank and infantry attack with artillery support, it was the Israeli's happy lot to seize

ground which the Arab tank reserves felt compelled to attack. It was sheer suicide for Egyptian tanks to move in the open against Israeli tanks which fired with only their turrets showing. The Israeli tank guns massacred their assailants. In Sinai alone, 850 assorted Egyptian tanks were accounted for against minimal Israeli tank losses and the lesson was repeated on a small but still disastrous scale in Jordan and Syria.

Every Israeli tankman speaking triumphantly after the event emphasized the power of the tank-mounted gun to defeat the tank, providing the right tactics were adopted. The key to victory, in their view, was skill. New weapons such as the Russian-built ATGW fired in some quantity by the Egyptians were derided—and for good reason. Barely a handful of hits had been obtained and those which had struck home accounted for only one tank casualty.

After the Six Day War, Israeli military opinion hardened against the ATGW and not simply because of their failure in June. It was sometimes conceded that the latest, larger sized Russian missiles might achieve better results in the hands of well-trained operators. In terms of cost within a tight military budget, however, the Israelis could see no point in adopting a specialized system which cost much more per round than those fired from the gun.

It would also overtax the training of what was mainly a part-time army. The Israelis rejected the ATGW and standardized their main battle tanks with the excellent 105mm gun. They did not, however, fit the simplified ranging gun

system in which the gunner, by firing a number of bursts from a .5in machine-gun establishes the exact range to the target out to 1,860 yards and thus allows accurate main-armament engagements to that range.

Those American M60 tanks which the Israelis acquired, though, were equipped with a stereoscopic range-finder which gave a good chance of a first round hit at 1,530 yards—some 220 yards better than that guaranteed with the techniques in use in 1967 but still well beneath the ranges in excess of 2,180 yards at which the 105mm gun could penetrate enemy armor.

In the Middle East, both sides built up their tank forces in the conviction that the gun-tank was supreme and the missile as yet no serious threat. Arab infantry nevertheless were supplied with the latest short range RPG bazooka-type weapon—the RPG 7, and took delivery of many more ATGW.

Misleading comparison

To the world at large, fed by the uncorroborated reports of correspondents and propagandists, it appeared likely that the initial Egyptian and Syrian attacks against the Israelis in Sinai and on the Golan Heights on 6 October 1973 recorded a great military success and, by implication, a severe defeat for a tank preponderant army. The visible victories scored by Russian-built SAMs against Israeli aircraft added force to the suggestion that ATGW were equally responsible for the rout of Israeli tanks in the days immediately following the surprise offensive. A comparison between the surface-to-air and ground-to-ground missile is misleading because the respective environments are so different.

It may be that those who credited the Syrians and Egyptians with a ground victory against an enemy they had always been defeated by reasoned that some new technology was involved—in fact Israel's poor showing in the opening days of the war was more likely due to her unpreparedness. She was taken by surprise, was not mobilized and in places the odds against her were 14-1. The aftermath of the Yom Kippur War was a resurrection of claims that the tank's demise was imminent.

It is likely that, as the Arab assault waves rolled across the thinly guarded shores of the Israeli Suez defenses, Russian-built Snapper ATGWs, with a range that is little more than 2,180 yards had their first great successes. It is equally possible that this has been exaggerated in the heat of battle and that, as the combat came to close quarters in what was, at first, an infantry confrontation, the RPG7s, a Russian anti-tank rocket launcher, enjoyed the same successes as the equivalent M72s at An Loc. It is virtually certain that the Israelis underestimated the ATGW as much as they did the Arabs, took unwarranted tactical risks at the outset with their tanks and paid the penalty. Eventually though, the tank came into its own as the battle became more mobile and as Israeli forces were fully mobilized and took precautions against the AGTW.

The most remarkable progress was made in the north by the Syrians in their endeavours to retake the Golan Heights. Here 1,400 tanks were thrown in and held by a mere handful of Israeli tanks backed by air strikes and artillery. This became the graveyard of Syria's hopes, for even though she was equipped with the latest Russian-built T62 tank, with its new 115mm gun firing finned shot, the defensive power of Israeli armor was relentless. With long fields of view in the face of defenders who knew the ranges to an inch, the Syrian tanks were destroyed amid a fusilade of tank fire

directed by a numerically inferior foe. Whatever the initial losses inflicted by Snapper ATGW on the Israeli tank force they were not sufficient to save about 800 Syrian armored vehicles from either being destroyed or abandoned. In less than a week they were in full retreat before massed Israeli tanks which clearly were not afraid of the ATGWs firepower.

With variations in timing and kind much the same sort of thing happened in Sinai after the Egyptians crossed the Suez Canal and three bridgeheads became virtually linked into one broad front. Initial successes were not maintained—the Egyptian advance was halted.

The victory of massed tanks armed only with the gun over tanks and the ATGW is seen as paradoxical by some observers. Though detailed analysis of the causes of tank casualties is not available, initial evidence suggests that the 1973 War was another victory for the gun, whichever side was using it. The balance of results was struck by the prowess of the participants: the skill of the commanders in gaining initial surprise (this the Arabs achieved), the courage of crews in battling for combat superiority (shown on both sides), and the response of leaders in making the most efficient use of resources at all levels from army command down to individual tank, gun and soldier (here, the Israelis, with their superior military equipment, came out on top).

It is difficult to draw too many conclusions from the 1973 War simply because it was fought in the desert where ranges of engagement, except in the slightly more enclosed country adjoining parts of the Suez Canal, are long and unimpeded. Here long range weapons are in their element. In terms of the global military balance between NATO and Warsaw Pact countries the war must have encouraged the West. In 1967 Russian defensive tactics were shown to be inadequate in the face of an attack by a Western-styled and Western-equipped opponent. In 1973 Russian assault tactics were defeated by rapid tank gun fire of the sort NATO tank tacticians and designers have evolved for any future European conflict.

Even the latest Soviet tanks, bravely crewed though they were, were demonstrably suspect, both in the blows they could deliver and the punishment they could take. All too frequently they were out-shot: all too regularly they blew up when hit.

What of the tank's future?

So what of the future of the tank? It resisted the missile in October 1973—can it continue to do so? A technological battle is on for developments that could swing the balance either way. In the case of missiles, the manually-guided missiles that were used in Sinai in both 1967 and 1973 are being supplanted by a new generation of semi-automatic types—above all the US Shillelagh and TOW, which was used experimentally at An Loc. These track the line of sight adopted by the operator who merely lays his cross wire on the target—and the missile flies to the point of impact. But the extra electronic gear needed both at the launcher's end and in the missile itself increase the complexity, cost and weight of the missile—so much so that the advantage of the launcher over the gun as a relatively inconspicuous and mobile infantry anti-tank weapon is negated. The value of these US missiles is that they are far easier to guide than the manual types and Shillelagh is unique in that it is launched from a gun which also fires conventional ammunition. Shillelagh has a 152mm shaped-charge warhead which can penetrate conventional steel or aluminium armor plate.



Stabilising fins now extended, Swingfire heads for target.
The FV438 APC is a British Royal Armored Corps vehicle.

British Aircraft Corporation

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Two men of the Royal Anglian Regt. aim the Carl-Gustaf 84mm recoilless gun, an AT platoon weapon. Four types of shell can be fired from this 35lb launcher—HEAT at moving targets up to 500 yards; static ones to 600; HE and smoke to 1,100 yards; flare shells with a folded parachute for illuminating targets up to 2,200 yards. The ammunition weighs from 5½ to 7lb. The M2-550 missile has an electronic sight for aiming a rocket-assisted HEAT round able to penetrate 400mm of armor at 750 yards.



Ministry of Defence

Shaped-charge warheads are practically essential for missiles to be effective. This is because missiles are eight times slower than the latest high-velocity solid-shot from guns, which move at between 4,000 and 5,000fps. Without such a warhead the missile's ability to penetrate armor is considerably reduced. But while shaped-charge warheads perform well against steel the performance falls off badly against low-density plastic. Plastic armor, of course, is much more bulky than steel and its use can present design problems—especially when the trend is towards smaller armored vehicles. In addition it does not provide much protection against solid shot. But a composite plate of steel and low density plastic might well, in the future, make hollow-charge missile warheads redundant without inflicting a penal increase in tank weight and without necessarily reducing protection against the high-velocity projectile.

The high-velocity gun is still being developed. The British have a 120mm mounted in their Chieftain tanks; it is superior to the almost universal 105mm but, like all high-velocity guns it is restricted in its application (at the moment) to beyond 1,860 yards, a limit imposed by the need to range the weapon with initial shots. The Russians have introduced a new smooth barrel 115mm gun in the T62 tanks—these appeared for the first time in action with the Syrian Army in 1973. This weapon fires fin-stabilized shot with an arrow head which has an even better chance of penetration than normal shot: yet there is still the ranging problem at longer distances.

The answer to the ranging problem at longer ranges is the laser. This allows an almost instant read-out of range to a specific point at the touch of a button. Experiments show that distances can be measured to within 10 yards, over a range of 3,280 yards. In late 1966, a Belgian project, incorporating US and German technology, devised a tank laser range-finder that achieved 97 per cent hits at 1,960 yards against moving targets and a very high first-round hit percentage at 3,280 yards. In terms of battlefield potential this means that the gun has achieved the same performance, at optimum combat ranges, as the missile while retaining the ability to fire any sort of ammunition—lower velocity shaped-charge or high-velocity shot.

In 1969 the Belgian Army ordered Leopard tanks from Germany on condition that, along with its conventional 105mm gun, an improved laser range finder should be

fitted. Also in 1969 the Germans, who had been co-operating with the Americans in the development of a highly sophisticated Main Battle Tank armed with the Shillelagh missile system, withdrew from the project and stated their preference for the high-velocity gun as main armament. There are no indications that the Russians now prefer the missile to the gun, or that they will abandon the tank as their principal instrument in land combat. The same can be said of every other important army. The main stream of armored fighting vehicle development is directed towards achieving major improvements, not only in armor protection and greater mobility but also in improving the fire power.

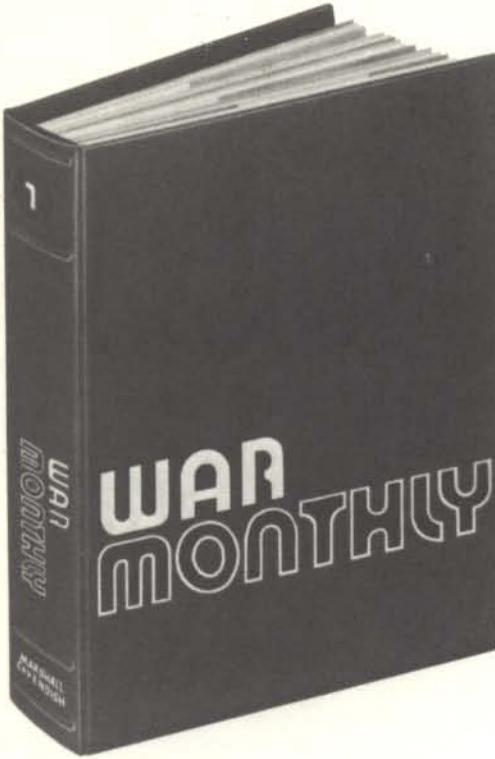
Laser range finding is only the first stage in raising the gun's battlefield performance and eventually all the factors that influence accurate shooting—range to target, target movement, wind speed, temperature effects and so on, will be fed to a computer to provide the tank gunner with the ability to fight an automatically accurate engagement with any enemy target within reach.

In response to this technological improvement to the gun there is little that the missile can economically offer. A fully automatic missile is feasible, one which, for example, acquires its target by laser direction or sensors and which, once launched, completes its journey without operator guidance. But the penalties must be further increases in weight, complexity and cost. Complexity on the battlefield obviously reduces weapon efficiency.

The land forces of today are heavily committed to the use of armored vehicles in ever increasing quantity and quality. There is nothing in recent campaigns to suggest a change in this pattern—for the reason that armored forces continue to offer the swiftest and cheapest way to obtain a decision. Long, bloody and expensive wars over a wide battle zone appear to be the alternative.

Armored forces, with their propensity to destroy rapidly and quite accurately, promote situations in which the most skilful side can occupy a position of dominating superiority in the least possible time and thereby reach a relatively cheap conclusion. And even if missiles or projectiles cause increased losses to armored vehicles they are unlikely to produce a radical alteration in the format of armies, but merely cause further evolutions in tactics in order to preserve armor's function on the battlefield.

Kenneth Macksey



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